SIMONS

THE HARDWOOD PROCESSING SECTOR IN BRITISH COLUMBIA

Jointly funded by

Western Economic Diversification Canada
and the British Columbia Ministry of
Development, Trade and Tourism

March 1991

Strategic Services Division

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Vancouver, BC

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The responsibility for the content of this report is the consultant's alone, and the conclusions reached herein do not necessarily reflect the opinions of those who assisted during the course of this investigation, the Federal and Provincial Governments which funded the study, or the members of the Steering Committee.

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EXECUTIVE SUMMARY

A. INTRODUCTION

Simons Strategic Services Division was commissioned by the British Columbia Ministry of Development, Trade and Tourism and Western Economic Diversification Canada to study the issues and constraints facing the BC hardwoods industry and to determine key success variables. The study was limited to wood product options that could be manufactured from the coastal alder resource and the Interior birch resource. Other hardwood species were not studied because they are largely committed to other uses.

All known BC (both currently operating and shut down) and some Albertan hardwood users were contacted, either by phone, questionnaire, or by personal visit during the course of the study. In addition, over 40 questionnaires, sent to professional BC foresters, were analyzed to determine the status of the current inventory.

Cintrafor, a Washington State based consultant, supplied data on the US Pacific Northwest industry which was used to compare the two industries.

Those people investigating opportunities within the hardwood sector are advised to proceed cautiously and to ensure that they review the issues, constraints and key success factors itemized in this Executive Summary. The following two tables graphically summarize the issues and constraints. This Executive Summary highlights the issues and constraints confronting the hardwood industry and is taken from the broad study which also reviews the development of the BC industry and compares the BC industry to the US Pacific Northwest industry.

Table 1
Alder Issues and Constraints

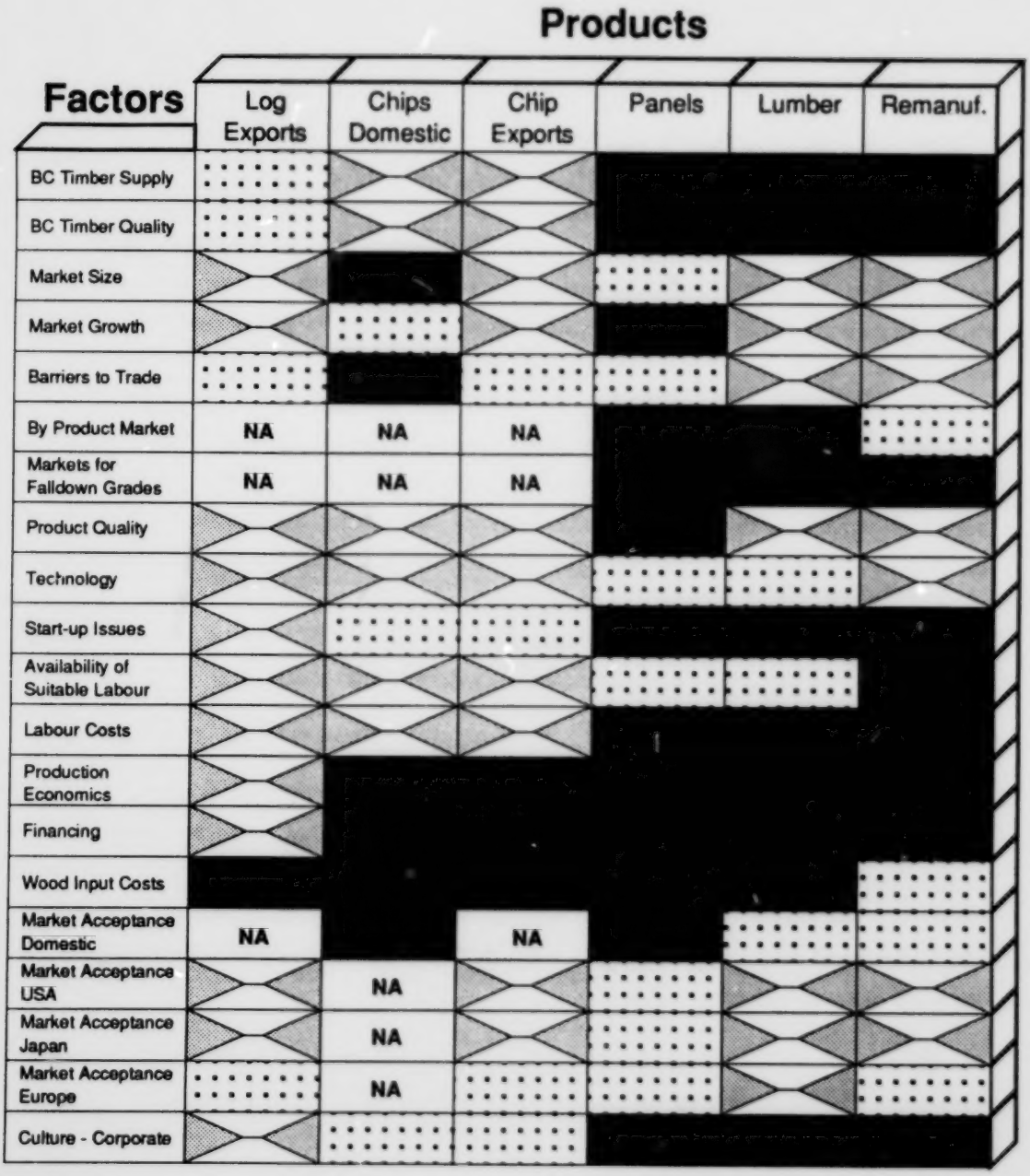
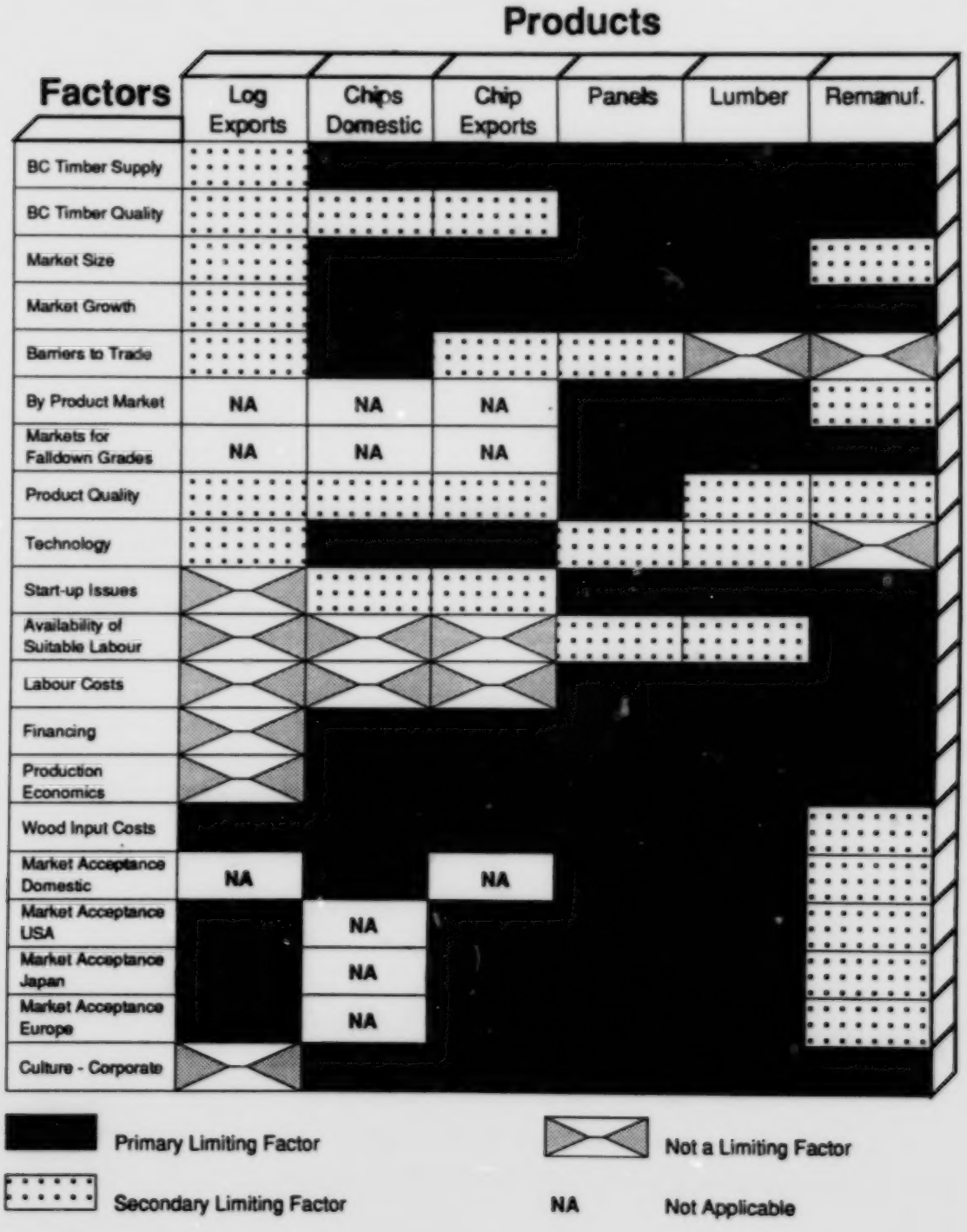


Table 2
Birch Issues and Constraints



B. ISSUES AND CONSTRAINTS

Resource

Quality! What Quality and Where Is It? .. (Major Constraint)

- There is little information available on the resource quality; rot, decay, age and diameter class distributions, etc., and this dramatically raises the cost of obtaining useful information for any new entrant.

- There are few solutions to this information problem. It has been suggested that an astute log buyer who has a good understanding of the alder and birch resource can help overcome this issue. However, due to the limited utilization of these species to date, these individuals are just not available to the new entrant.

- Experienced existing hardwood operators suggest that the quality of alder is extremely site specific and that the percentage of timber of adequate quality to be sawlogs is only 10% to 20% of the total available (estimated to be between 300,000 to 450,000 m^3/year) whereas the US Pacific Northwest produces from 65-85% sawlog grade material.

- Log quality deteriorates rapidly as hardwood stands pass maturity. Existing operators suggested that alder logs beyond the 50 to 60 year age class contained too much rot to be considered sawlogs. This rot can often be difficult to determine prior to processing the log.

- Once harvested, hardwood log quality can degenerate rapidly over time and alder chips have a short 'storage time', typically 100 days. As alder chip producers have to allow for the shipping time from Canada to Japan, this can significantly reduce the available time for processing the logs. This greatly increases the risk of being perceived as a marginal supplier by the consuming markets.

- Alder lumber has to be produced within a relatively short time of falling the log. This time period is shorter in the warmer summer months.

High Logging Costs (Major Constraint)

- Existing alder and birch operators complain that hardwood logs are priced at the same levels or higher than softwood logs. They believe these costs are not justified because the stumpage fees for hardwoods are so much less than softwoods ($0.50/m^3 versus $6+/m^3 for softwoods). In addition, hardwood operators suggest that there are little if any incremental costs associated with logging hardwoods, if they are logged at the same time as the softwoods. When investigated these arguments failed because:
  - Historic access to the inlets, the sites where alder is likely to grow, was accomplished by barge. This has meant that BC does not have a road infrastructure into these areas that can be re-used, whereas in the US Pacific Northwest these road networks exist. Consequently, there are substantial costs of going after the alder component and these costs are not incremental to softwood logging operations.
  - There are additional costs in harvesting birch compared to a softwood operation. These costs are due to:
    - birch has a lower yield per hectare than softwoods;
    - generally the logs are bucked to shorter lengths because of twist and crook;
    - trucks carry smaller loads because the density is significantly higher.

- The evidence collected indicates that some of the 'best' alder stands are simply uneconomic to log at the present time.

Seasonal Pattern of Logging (Secondary Issue)

- Birch can only be logged in the winter and fall. First, the high moisture content of birch harvested during the spring and summer, times of high sap, creates downstream drying problems. Second, if birch is not harvested when the softwood component is harvested, it has to be retrieved when the snow cover provides enough 'cushion' so that the young softwood trees are not damaged.

- This seasonal supply of logs introduces supply disruptions. The birch processor either has to inventory a sufficient volume of logs to carry him through the season or the processor has to educate the market to accept supply disruptions. Inventory costs have to be factored into the business plan, as markets would rather switch to alternative species than deal with supply disruptions.

Resource Management and Government Policies (Secondary Issue)

- Current hardwood resource management practices, hardwood eradication, merely appear to discourage, and not inhibit, the rate of growth of the industry. Entrepreneurs still try to exploit perceived opportunities. It is interesting to note that the US Pacific Northwest industry shares much of the same concerns and clearly the lack of a proactive hardwood resource management policy has not stopped their industry from growing.

- In many areas of the province, hardwoods are considered a weed species not acceptable for restocking. Emphasis or priority is directed towards hardwood eradication.

- If a sustainable hardwood industry is to be maintained, or enhanced, then in certain areas and on selected sites hardwoods must be accepted as a desireable species for restocking, and managed accordingly.

- Because alder grows along valley bottoms and alongside streams there will be restrictions in many areas to provide for the needs of other resource values such as wildlife, fish, recreation and aesthetics. This could be a very major and serious constraint affecting the continuity and maintenance of the existing hardwood industry, much less any expansion to it.

- The 80/20 rule, which states that 80% of a forest stand's gross volume must be comprised of hardwood species before it can be harvested under a hardwood licence, constrains the availability of a consistent and adequate supply of hardwood timber in BC. Furthermore, much of the higher quality hardwood timber is located in mixed stands that do not satisfy this rule.

Volumes, Here Today But Where Tomorrow ... (Minor Constraint)

- Although hardwood inventory data is considered inadequate in most Forest Regions and Districts, it is not, in itself, considered a major constraint to current hardwood utilization. This issue is a minor constraint in the near term, but could be a major constraint in the future as overharvesting could lead to sustainability problems.

- The industry's current annual alder requirements are in the order of 400,000 to 500,000 m^3, whereas the sustainable annual cut, based on current information, may be in the order of 300,000 to 450,000 m^3.

- An accurate, reliable hardwood inventory is absolutely essential if a viable hardwood industry is to be established and maintained. Ministry of Forests personnel have suggested that there is just not as much alder on Crown lands in the Vancouver Region as most people seem to expect. Classifying hardwoods as 'weeds' seems to suggest that there are vast untapped quantities. This may not be true!

- Much of today's 'knowledge' is based on opinion and perception. Accurate and reliable data is required in order to formulate proper management objectives, policies and regimes. The hardwood work program proposed by the research branch of the MoF is a positive step in this direction.

Markets

Good High Grade Markets .... Limited Falldown Markets (Major Issue)

- There is a strong and growing market for high grade alder lumber as well as semi-finished and finished components for the millwork and furniture industries. The markets include the US, Japan, Italy and Germany.

- Markets for western birch have not been developed to any great extent. Limited market testing indicates that potential markets do exist for the upper grades of birch, however, several users or potential users of birch have identified a number of drawbacks surrounding birch usage which need to be further researched.

- The domestic demand for the medium and lower grades of hardwood are limited. While the high grade/high value material can bear the transportation cost to distant markets the lower grade/lower value material cannot. Thus the lower grades are targeted to local markets where the limited market demand depresses prices for these grades.

No Domestic Chip Market (Major Issue)

- There is no domestic market for alder and birch chips. Possible users (e.g. pulp mills, reconstituted board mills, etc.) have met their needs with softwood chips and have not required these incremental supplies.

- As in the softwood sawmilling industry, a chip outlet is necessary for the long-term survival of a hardwood lumber producer. The key is to establish a long-term market for these by-products and honour that long-term relationship by meeting the needs of the buyer, which in many cases may be the Japanese.

- Narrow profit margins will continue to mar some satellite chipping facilities. Only under unique relationships and circumstances can an independent hardwood chipping facility stay profitable over the long-run.

- Development of a domestic industry that utilizes hardwood chips would go a long way to making a small hardwood venture viable. Although offshore demand for hardwood chips is growing, BC functions as a swing supplier of hardwood chips and is often the first supplier shut down when markets weaken.

Specialty Mentality is Critical .... (Major Issue)

- Producers must be responsive to the buyers' needs to succeed in high value hardwood markets. The producer's inability to satisfy the end-user's needs can limit growth and profitability. A brief lapse in the level of service and quality of product delivered can seriously jeopardize a market that took considerable time, effort and resources to develop.

- Semi-specialty and specialty products cannot be successfully manufactured with a commodity mentality. The high value markets for alder, birch and maple are not in the commodity spectrum and these species are not well suited for building construction applications. Although some producers are converting BC's hardwoods into commodities such as core veneer, chips for pulp, or reconstituted boards, this is being done in conjunction with softwood production and/or at an economy of scale. The trade off between high volume output and high quality (at the expense of volume) is an important consideration for hardwood operations targeting the high value markets.

Distribution Channels are Critical (Major Issue)

- An effective distribution system is important in developing and maintaining a successful hardwood operation. However, the channels of distribution and associated service requirements can vary significantly depending on a number of key factors including the level of product manufactured, end-use industries and geographic markets.

- Strong distribution networks have been established to serve select market segments and some markets require their suppliers/distributors to provide special services.

Restrictions on Log Exports (Secondary Issue)

- The log export markets provide an outlet for low quality hardwoods but this is not viewed as a growth market. With the growing interest to process BC's hardwoods domestically, very little of the total hardwood harvested will be exported offshore as raw logs. Also, there are increased pressures to reduce log exports because of the perceived lost jobs and revenues.

- Nonetheless, some producers use the export market to generate cash flow from some of their low quality logs. Furthermore, some high quality alder sawlogs have been exported for processing in the US but a recent conversion of a BC softwood sawmill to cut hardwood lumber has created a Canadian demand for this resource.

Other Product Options Exist for BC Hardwoods (Minor Issue)

- Hardwoods are being peeled as an inexpensive substrate but the market opportunity is considered to be quite limited. High priced softwood stumpage is the major reason for utilizing and/or evaluating hardwood veneer. However, COFI standards currently only allow the use of 5% mixed hardwood species for certain Canadian plywood markets.

- Although reconstituted boards, such as MDF and OSB, could provide an additional outlet for low grade hardwood material, this is not considered to represent a promising market opportunity for BC hardwoods.

Process

Management is Crucial and Technology is Available (Major Issue)

- Skilled management of the manufacturing process, associated technologies and the product mix is an essential element to the success of a hardwood operation. Even minor variances in specified tolerances, recovery rates and product mix can mean the difference of being profitable or unprofitable.

- Proper management of the product mix is critical. Some producers have accepted orders for very high priced items only to later realize producing the product develops a disproportionate volume of off-grade material yielding a low value and resulting in an unacceptable average price for the total product mix.

- Technology currently exists to meet the demanding requirements for high value markets. This is evidenced by the high value markets in Japan, Europe and the US which have been developed and served by US alder producers.

- The type of equipment required and the associated capital investment can vary significantly depending on the quantity and quality of raw material processed and the degree of processing and the product requirements for targeted market segments. However, some small remanufacturing operations have been able to successfully produce products for some very demanding high value niche markets with relatively small capital investment.

- In serving markets for high value hardwood lumber it is important to recognize special manufacturing processes may be involved. For example, select market segments have shown a preference for abrasive sanded surfacing for high grade alder lumber versus planed surfacing for commodity material. Furthermore, the importance of proper kiln drying and conditioning cannot be over emphasized since this process can significantly affect dimensional stability, colour, gluing properties, grade recovery, etc.

With Respect to Kiln Dried Hardwoods, Demand And Supply Are Not In Balance (Secondary Issue)

- The BC demand for kiln dried hardwoods outstrips the local production of KD material. Several remanufacturers in BC have used kiln dried softwoods or kiln dried hardwoods sourced out of Eastern Canada, the Pacific Northwest and the Eastern United States because they cannot get a reliable supply from BC primary producers.

- Kiln drying of hardwoods is significantly more difficult than softwoods. Kiln schedules and kiln sizes tend to be considerably different in hardwood processing than in softwoods.

Economics

Limited External Sources of Funding Available (Primary Issue)

- The lack of historical data and precedent in the hardwood processing sector inevitably increases the perception of "high risk". High risk funding sources, i.e. venture capital, are often not attracted to this industry because there are very few exit alternatives.

- The potential investors frequently underestimate the amount of development capital required to bring a project to the financing level. The time needed to bring a well researched request for funding to a potential capital source may take one to two years from the initial concept.

- The entrepreneur generally has to fund the project to a level where a professional business plan can be presented. External sources of funds may be available at this stage, however the process of obtaining these funds can be long and arduous.

Production Economics (Primary Issue)

- Return on capital of hardwood chipping facilities, lumber facilities and integrated chip/primary facilities were found to be very sensitive to log costs and product prices (i.e. lumber and chip prices). However, the sensitivity decreased through increased processing and vertical integration.

- The success of the primary operation is critically dependent on: availability of a chip market; quality and size of log input which determines lumber grade output; economies of scale, and whether or not the mill has kiln drying capacity.

- Further movement up the value chain (movement from primary into remanufacturing) and/or integration of primary with remanufacturing could lead to less sensitivity to costs and prices and a smoother cash flow.

Labour Rates (Primary Issue)

- Those in the hardwood processing sector confirmed that managing the business was usually a question of managing for survival. Most small businesses are managed on a cash basis and labour is one of the few variable costs that a plant has control over. Consequently, high labour costs could certainly inhibit investment and could make a significant difference to finding markets for the lower grades of products. Any barrier that inhibits access to markets for low grade products is viewed as a significant issue.

Residue Disposal Costs (Secondary Issue)

- Small scale producers, both primary and remanufacturers, have real costs associated with removal and disposal of their waste products such as bark, kiln-dried trim ends, and sometimes chips. Although this is an important issue, it is not considered a primary issue by existing operators as they have solved their particular problems.

- This problem can be compounded as chip discoloration, due to oxidation and bacterial action, within sixty days of production can rapidly erode the value of any chip pile. Local markets for animal bedding or energy are limited, and often present a least cost alternative to the manufacturer.

- This problem is not limited to the hardwood sector, and is a real barrier to the emerging softwood BC remanufacturing sector. A solution to the problem will require industry co-ordination and is certainly beyond the capabilities of any single operator. At this time, solutions are still needed.

Culture and Education

Supplier Must Be Responsive to the End Users Needs (Major Issue)

- To compete internationally, the culture of the end-user must be taken seriously. The semi-specialty and specialty forest products market, and even parts of the commodity markets, are not controlled by the producer. The buyer has become increasingly demanding concerning product and service requirements.

- Understanding the behaviour and the culture of international buyers and investors is a key ingredient for success. Although it may be possible to initially target just the domestic market, as competition increases it becomes increasingly difficult to survive based on this market alone.

- Coordination between buyer and seller will improve the probability for success. Currently there is very little coordination between the needs of the hardwood supplier and buyer in BC, which in turn has inhibited the production or use of BC sourced hardwoods.

- This problem can be converted into opportunities by:
  - establishing a long-term relationship between the supplier and buyer; or
  - establishing a vertically integrated operation.

- The successful hardwood operations in existence today have a close tie and relationship with its suppliers, many of which are located outside BC.

Long Term Commitment Required (Major Issue)

- Firms must recognize that success in the semi-specialty and specialty markets emanates partially from "learning-by-doing" and a long-term posture and commitment. A firm must be willing to spend time cultivating its markets and establishing a reputation for quality.

- It is also important for the firm to recognize the learning curve associated with the products it is producing, the raw materials it is using, the technology it is employing and the markets it is exploring.

- The duration of the learning stage can be shortened through research and the use of skilled labour.

Trial and Error Can Be Expensive! .. (Major Issue)

- Thorough market research is a key ingredient for success. Identifying and developing a market is not easy and should not be under estimated. The primary markets and key potential buyers for all product grades to be produced should be identified and evaluated prior to preceding with any major capital investment.

C. KEY SUCCESS FACTORS

A secure resource supply is critically important for success. Harvesting of hardwood is primarily driven by coniferous log production and as a result the hardwood log supply is dependent on the economies of the coniferous industries. Furthermore, even when logging activity is "high" the volume of hardwood may remain low depending on the area being harvested. Success is dependent upon establishing a relationship with a TFL owner for a consistent and adequate source of supply at competitive price levels.

Success is heavily dependent on the ability to market the full product mix obtained from the available resource. While a portion of the product mix may carry a high value it is necessary to develop markets for lower grade products, falldown grades and byproduct chips. Market research should be conducted to identify market opportunities for the full product mix.

Strong financial backing is critical to carry an emerging company past the start-up phase and through a reasonable period of market development. Unfortunately, many starts do not have sufficient funds to survive the inevitable learning periods and the time required to establish a reputation in the market.

A marketing orientation is an essential ingredient for success. This includes maintaining close contact with the market and being responsive to market requirements.

A "hardwood corporate culture" that is supportive of specialty products and niche marketing is important. This encompassed such important aspects as:

- producing for grade recovery rather than volume;
- flexibility, responsiveness and commitment required to serve niche markets;
- recognition that hardwood niche markets take time to develop.

Senior management must be committed to establishing and supporting this philosophy at all levels of the organization. Successful hardwood operations are generally small in size compared to many softwood operations, which is a contributing factor in achieving and maintaining the "hardwood culture".

A stable and dedicated labour force is an important ingredient for success. This is especially true when the customer's specifications may be both demanding and unique and margins are extremely sensitive to recovery rates. The ability to compete for labour with the level of skills desired could be enhanced with a benefit package that includes some form of incentive pay.

Kiln drying capacity is needed for the success of sawn hardwood operations. Since the softwood industry in BC doesn't have excess kiln drying capacity and recognizing drying schedules are different for hardwood and softwood, hardwood operations should construct their own kilns or have access to a shared kiln.

1.0
INTRODUCTION

The BC hardwood industry is having a hard struggle to establish credibility and critical mass. Despite a history of many failures and few successes, the industry continues to attract entrepreneurs who have the vision that they can unlock the keys to success. It is little wonder that these entrepreneurs are attracted to this industry as the US Pacific Northwest (defined in this report to include both Oregon and Washington) has developed a strong and flourishing hardwoods industry.

The Strategic Services Division of H.A. Simons was commissioned to investigate the issues and constraints facing the BC hardwood industry. The study focussed on the coastal alder resource and on the interior birch resource. Other hardwood species, such as aspen and cottonwood, were not included in the terms of reference, as these species are largely committed to other uses. The study was restricted to solid wood product and byproduct options, and did not include alternatives such as: energy; firewood; briquettes; smoking chips; reconstituted board products such as OSB or MDF; or any pulp and paper options other than chip production.

The study team assumed the role of an investor interested in entering the industry, to ensure that all aspects would receive unbiased, critical attention. As a first step, the use of hardwoods in both BC and the US Pacific Northwest was reviewed. This information is summarized in Chapter 2 of this report.

Cintrafor, a Washington based consultant, prepared two case studies of successful US companies. This information was used to determine what lessons and parallels could be drawn between the US and Canadian experiences. This information completes Chapter 2, and provides a background for understanding of the BC issues.

During the course of the study, all known existing BC hardwood (alder and birch) processors were contacted. In addition, every effort was made to contact those processors that had previously been unsuccessful in the industry. Questionnaires were then sent to those contacted. After receiving the responses, interviews were then conducted to obtain insights into the issues and constraints faced by these operators (summarized in Chapter 3).

A comment frequently made about the BC hardwood industry is that the knowledge of the resource and inventory is quite incomplete. To determine how well the hardwood inventory is known, a questionnaire was sent to over 60 knowledgeable BC Foresters. Over 60% of these work for the BC MoF, and the remainder are employed by private BC companies. Over 40 responses were received and analyzed. This information is summarized in Appendix G.

Information on key success factors can be found in Chapter 4.

The conclusions and recommendations are summarized in Chapters 5 and 6 respectively, and are focussed on answering those questions that a potential investor should ask, prior to proceeding with a capital investment in the hardwood industry.

2.0
CURRENT INDUSTRY STRUCTURE IN BC

2.1 INTRODUCTION

The road to success in BC's hardwood industry has been long for some and lifeless for others. This chapter sets the stage for understanding the issues facing the industry. The focus is on the coastal and interior hardwood industry, and in particular the alder and birch industry.

2.2 COAST

Inventory and Log Production

The coastal hardwood resource is predominately comprised of three species: red alder (Alnus rubra, Bong.), broadleaf maple (Acer macrophyllum, Pursh.) and cottonwood (Populus trichocarpa, Torr. & Gray). Small inventories of white birch (Betula papyrifera, Marsh.) and aspen (Populus tremuloides, Michx.) are scattered throughout the Coastal region as well.

The MoF assesses the current inventory of hardwoods on the Coast to be only 16 million m^3, 56% of which is comprised of alder. As noted, the remaining species are primarily cottonwood and maple. The species composition of the inventory is depicted below.[1]

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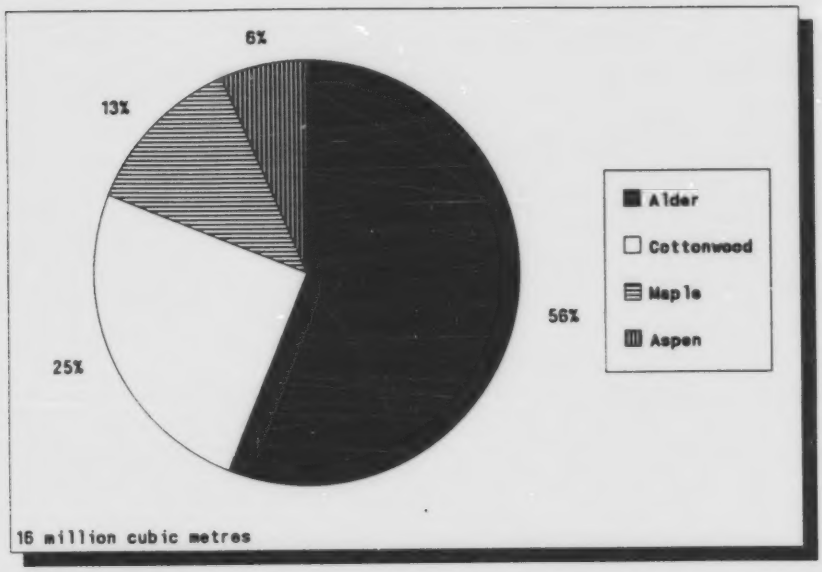
[1] A more detailed account of the inventory is provided in Appendices H, I and J.

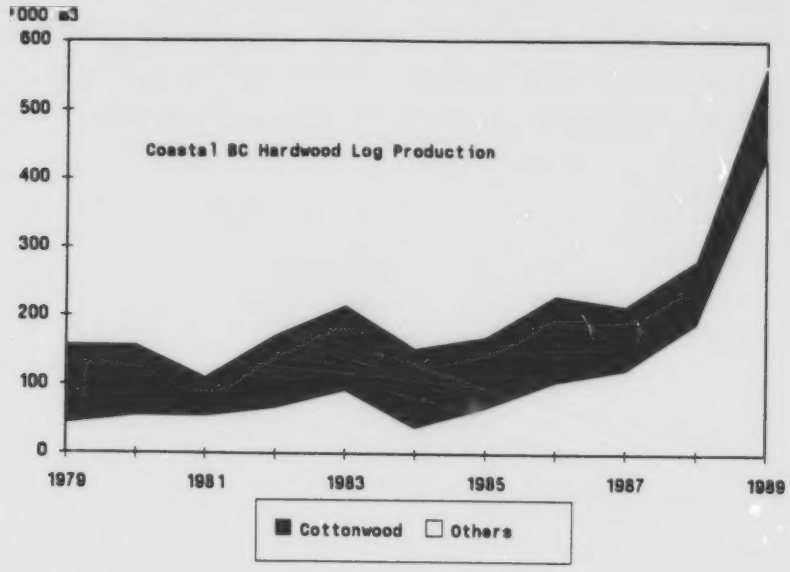
Figure 2-1
Coastal Hardwood Inventory
1989



Source: COFI

Hardwood log production on the Coast has increased from 158,000 m^3 in 1979 to 282,000 m^3 in 1988. In 1989, production jumped to 567,000 m^3 with the full start-up of Primex's chipping facility and Norvik's hardwood lumber operation (refer to Figure 2-2). These facilities predominately consume red alder but have utilized small quantities of birch and maple. The major processor of cottonwood found on the Coast is Scott Paper Ltd., therefore the harvest levels of cottonwood have followed the market for tissue grade papers, but have remained relatively stable over the last two decades.

Figure 2-2
Coastal Hardwood Log Consumption



Source: COFI

Chip Production

Primex operates an alder chipping facility in BC's Lower Mainland. It started production in 1989, and consumes between 200,000 and 250,000 m^3 of alder logs per year, some of which is imported from the US Pacific Northwest and all of which is purchased from the open log market. Primex's product - alder chips - is produced for the pulp and paper industry in Japan.

Over the last year and a half, Discovery Hardwoods[1] has placed alder chips into the Japanese market as well. However, Discovery Hardwoods has been forced into receiver-ship, fueled by high delivered log costs and a drop in purchase orders.

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[1] Discovery Hardwoods used alder logs harvested from its hardwood licence and logs available from small landowners. However, the firm has relied predominately on open market purchases because the cost of logging is too expensive.

To date, no local market for coastal alder chips exists. Many existing and potential pulp and paper mills in BC[1] are or will be incorporating aspen or cottonwood in their furnish but have yet to use alder chips, mainly due to lack of a consistent and adequate supply. The few reconstituted panel operations located in the province are also not using alder chips, shavings or sawdust.[2] As a result, alder chip production is being channeled into offshore markets.

Primary Manufacturing

Once labelled "the only long-term survivor in the coastal hardwood industry", West Coast Hardwood Ltd.[3] was the only company on the Coast processing products from alder, maple and birch in 1977 and 1978. Although others have entered the market, many have failed.

Lumber Production

There are very few companies in BC producing lumber from coastal alder (approximately 20% of BC sourced alder is converted to lumber), although by contrast, over 63% (Cintrafor, 1990) of the logs consumed in the Pacific Northwest are converted into lumber products.

Little Mountain Sawmill is cutting some grades of lumber from alder and other hardwoods. This mill produces about 8 Mfbm per shift. Norvik Timber has the capacity to produce various grades of alder lumber. With the full start-up of this mill, total Coastal hardwood lumber production could reach 27 Mmfbm per year, requiring over 120,000 m^3 of alder roundwood.

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1 Scott Paper of New Westminster consumes cottonwood; Quesnel River Pulp Co. of Quesnel consumes aspen. Three other pulp mills, Vanderhoof, Louisiana Pacific and Fibreco will consume aspen.

2 Maloney's (1978) research (see Appendix D) showed that the properties of panels made from red alder exceed the minimum standards required for structural panel products.

3 West Coast Hardwoods Ltd. is no longer in existence, however a former employee is the principal of CarlWood Lumber.

Pacific Pallet will begin producing pallet stock hardwood lumber at its sawmill in the first half of 1991 after initial design flaws put the operation on hold for some time. The mill will produce lumber using alder logs from BC and the US, and BC sourced birch and maple. The product will be consumed by the company's pallet construction division in Aldergrove. Finally, the owner of a sawmill in Terrace has a hardwood licence to harvest 8,000 m^3 birch from previous cut-over areas. The mill has temporarily been shut down until the owner gathers enough financial resources to establish markets for its products.

There are a number of small portable sawmills cutting alder, maple and birch for firewood and lumber stock.

Panel Production

There are very few publicly available statistics on the Coastal hardwood panel industry. In 1989, the entire BC hardwood plywood industry exported $4.3 million worth of product, 98% of which reached US consumers (COFI). This is up from $2.2 million in 1979. By contrast, the value of hardwood veneer exports from BC has declined over the 1979-1989 period. Veneers accounted for $1.6 million in 1979, however by 1989 veneer exports were only worth $0.9 million.

There are two companies on the Coast producing hardwood veneers. In addition to peeling softwood veneer, Coastland Wood Industries Ltd. peels veneer from approximately 23,000 m^3 of alder and maple. Westcoast Plywood Ltd. has peeled some cottonwood veneer and has plans to increase its use of this species. Richmond Plywood Corp. has explored peeling cottonwood, but ran into difficulties with the spindleless lathe they were using at the time.

Pulp/Paper

Scott Paper Ltd. is the only company located on the coast utilizing hardwoods in its fibre furnish. It consumes cottonwood, along with softwoods, in its stone groundwood facility. As noted, the use of alder, birch and maple chips by the domestic pulp industry has yet to occur.

Secondary Manufacturing

Pacific Pallet Ltd. of Aldergrove has been in the business of producing wooden pallets, bins and containers since 1965. It currently draws on Washington sourced pallet stock lumber as a source of input. At present, they produce a combination of alder, birch, maple and softwood pallets. Once its domestic sawmill is operating, Pacific Pallet will supply their own stock.

CarlWood Lumber Ltd., a hardwood company that has been in operation since 1984, operates a remanufacturing facility, a portable sawmill and a dry kiln. The mill consumes primarily alder and maple, with much of the production going into the upholstered furniture market.

Stork Craft Ltd. uses significant quantities of wood each year to produce children's furniture, primarily baby cribs. Its products are made from both softwood and hardwood species. Stork Craft contends that BC manufacturers cannot supply a competitively priced product, consequently the company consumes very little product processed by BC based remanufacturers.

Another firm custom cutting for the semi-commodity and specialty markets is Bill Smith Forest Products in Chemainus. Using small quantities of alder and maple, it produces flooring for the local markets. However, a large proportion of its wood input is comprised of softwoods. Other remanufacturing facilities such as Vintage Woodworks, BC Millwork Products/Artek Ltd. and Gregg's Furniture Manufacturing use small volumes of alder and maple.

The Coastal firms known to be using BC sourced hardwoods are summarized in Table 2-1. There are some portable sawmills on the coast cutting alder for the lumber and firewood markets which have not been included in the table.

Table 2-1
Summary of Coastal Hardwood Producers

Existing

Company	Location	Hardwood Products (species)
Primary Sawmill		
Little Mountain Sawmill	Parksville	Lumber, fencing (A)
Norvik Timber	Delta	Lumber (A)
Remanufacturers		
Pacific Pallet	Aldergrove	Pallets, boxes, bins, containers, etc. (A,B,M)
CarlWood	Maple Ridge	Factory lumber (A,B,M,O)
Stork Craft	Richmond	Furniture (A,O)
Gregg's Furniture	Victoria	Furniture (A,M)
Vintage Woodworks	Victoria	Millwork, spindles, mouldings (A,M,O)
BC Millwork Products	Vancouver	Interior doors (B,M,O)
Smith Forest Products	Chemainus	Flooring, panelling (A,M)
Log		
Skeena Cellulose	Terrace	Logs (B,C)
Veneer/Plywood		
Coastland	Nanaimo	Veneer (A,M,O)
WestCoast Plywood	Vancouver	Plywood (C)
Tissue		
Scott Paper	New West.	Tissue Products (C)
Chips		
Primex	Delta	Chips (A,B,M)
Discovery Hardwoods	Courtenay	Chips (As)

Anticipated

Company	Location	Products
Pacific Pallet	Aldergrove	Lumber (A)
Bill Harvey	Terrace	Lumber (B)

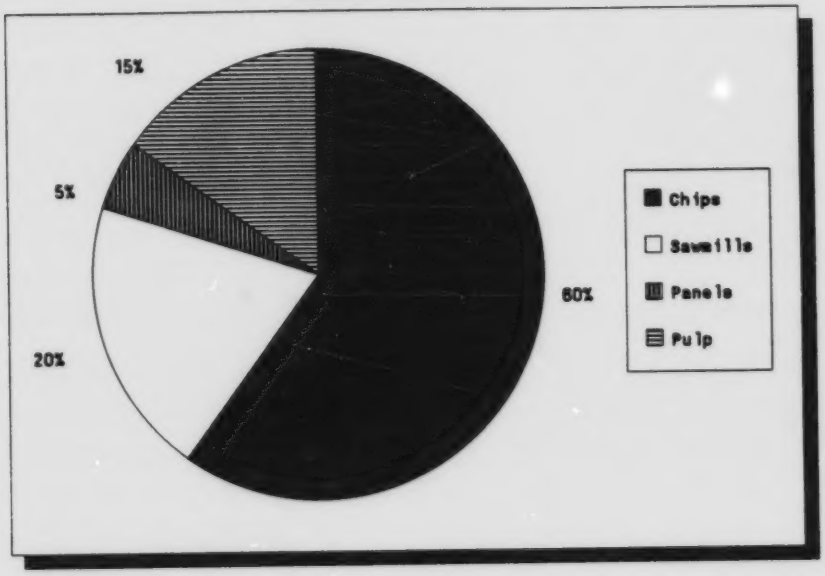
Notes:

(A) - red alder; (M) - broadleaf maple; (B) - birch; (C) - cottonwood;
(As) - aspen; (O) - other hardwoods;

Summary - Coast

Total log consumption in 1989 was about 0.6 million m^3. Of this, Simons estimates that about 60% was chipped for the international pulp industry. The other 40% was consumed in panel, lumber and pulp facilities; Log exports have not been included in this distribution. This is illustrated in Figure 2-3.

Figure 2-3
Hardwood Log Consumption Mix
Coast - 1989/90



Source: HA Simons SSD

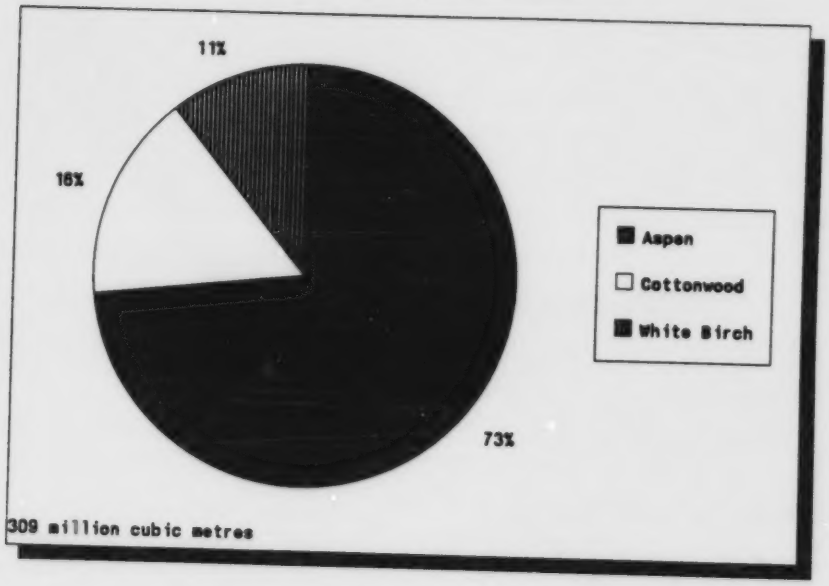
By the year 2000, Simons SSD estimates that more value will be extracted from the resource as a relatively greater emphasis is placed on producing lumber for the remanufacturing industry. This is predicated on the assumption that the primary producers can profitably sell their chips into the international market. As will be raised again later in this report, the international market for hardwood chips is growing but it becomes extremely difficult for a single, primary producer to supply this market at a profit. Therefore, unless a BC market for alder, birch and maple chips emerges over the next ten years or a number of small firms combine their chip output for the offshore market, the hardwood industry will most likely continue to be focussed on chipping whole logs for export markets.

2.3 INTERIOR

Inventory and Log Production

Interior producers of hardwood products rely predominately on aspen, white birch and cottonwood.[1] Aspen accounts for 73% of the total Interior hardwood inventory of 309 million m^3 (see Figure 2-4). Appendices H, I and J provide a detailed account of the hardwood interior inventory.

Figure 2-4
Interior Hardwood Inventory

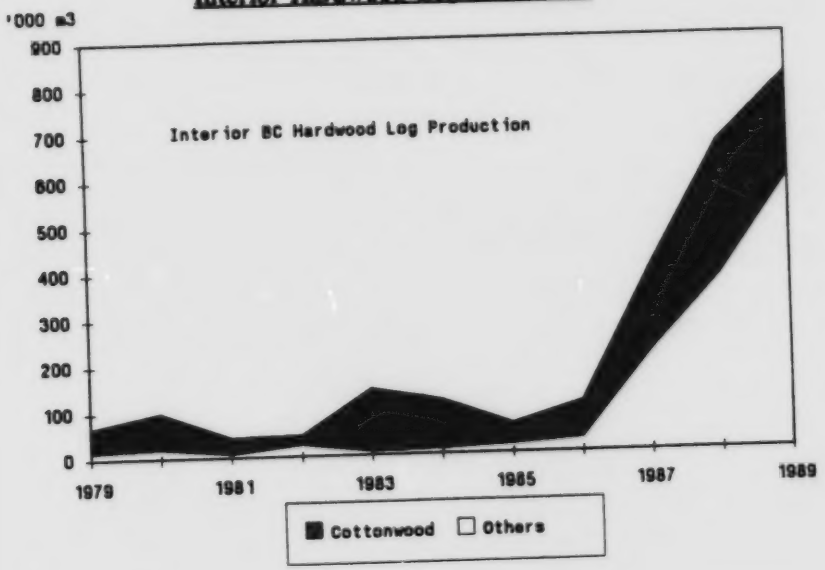


Source: COFI

[1] Interior cottonwood includes both black cottonwood and balsam poplar (Populus balsamifera, L.).

The log production statistics in Figure 2-5 reflect the start-up of Louisiana Pacific's OSB mill in Dawson Creek in 1987. Over the 1979-1989 period, cottonwood log production has increased 323% while production of other hardwoods, mainly aspen, has risen a dramatic 3,840%. With the start-up of a number of pulp mills incorporating aspen into their fibre furnish, these numbers will continue to rise.

Figure 2-5
Interior Hardwood Log Production



Source: COFI

Chip Production

There are currently no satellite mills in the Interior chipping hardwoods for the domestic or export pulp market.

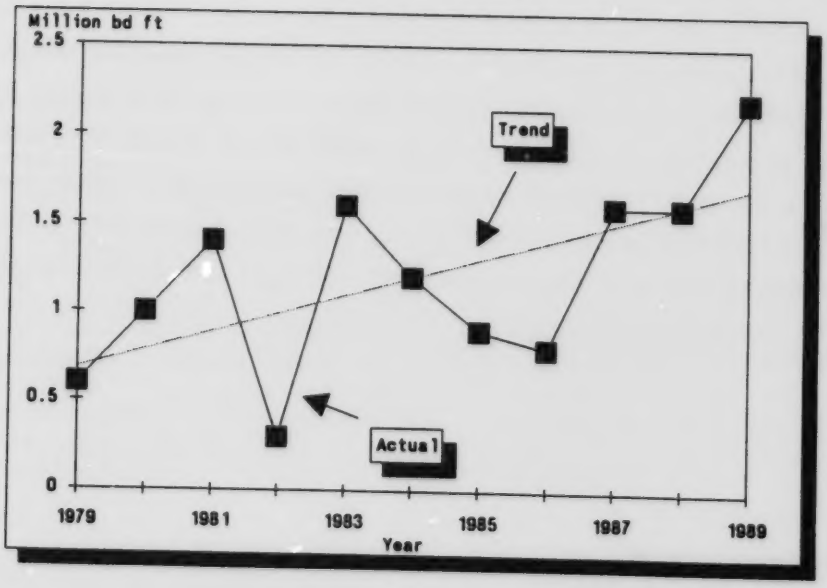
Primary Manufacturing

Lumber Production

At least one large producer in the Interior has experimented with cutting aspen dimension lumber for the Pacific Rim markets. A small Interior producer, Midget Mills in McBride consumes some birch, but only on a demand basis. A local hardwood floor manufacturer is presently shut down, reducing Midget's birch lumber production to insignificant levels. While many remanufacturers do not favour the birch because of its prominent heartwood stain, it is still being manufactured for the door, truck lining, dresser drawer, flooring and upholstered furniture markets. Finally, several small producers are cutting cants and firewood from birch and cottonwood.

Total Interior hardwood lumber production has been cyclical over the last decade, reflecting economic trends, but has increased on a trend line basis of 10 % per year, as is shown in Figure 2-6. Nonetheless, hardwood lumber production in the Interior of BC represents only 0.02% of the total Interior lumber production.

Figure 2-6
Interior Hardwood Lumber Production
(million board feet)



Source: COFI

Panel Production

The largest consumer of Interior aspen, and for that matter Interior hardwoods, is Louisiana Pacific. In Dawson Creek, Louisiana Pacific consumes aspen in its oriented strand board facility. Tackama in Fort Nelson, another major consumer of hardwoods, has the capacity to produce hardwood veneer from approximately 145,000 m^3 of cottonwood. Finally, Tolko Industries Ltd. has been experimenting with peeling birch and aspen the last few months, with plans to cut some volume of these species on a full time basis.

Pulp/Paper

Aspen has been combined with softwood species in the Quesnel pulp facility, with future producers such as Louisiana Pacific (Chetwynd), Vanderhoof and Fibreco realizing the economic and fibre colour advantages of aspen[1].

Secondary Manufacturing

Other than aspen, the use of Interior hardwoods has been relatively minor. Darfield Building Products Inc. of Darfield, BC consumes a small quantity of birch, amongst several softwood species, to produce log home components. Francois Lake Woodworking is a successful company that converts birch into elegant panelling using tongue and groove technology, and produces semi-finished chopsticks from aspen. Most of its products, nonetheless, are produced from softwood species. Syncra Wood Products Inc. of McBride is designed to produce tongue and groove flooring from birch but is presently sitting idle. BWP Millwork produces flooring and other products from birch and maple, but, because of a lack of supply consistency and short term availability, has primarily drawn on eastern sourced hardwoods.

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1 Because of its whiteness, aspen requires less bleaching than softwoods. Also, with today's technology, aspen can be refined using mechanical pulping processes into a pulp that has strength properties similar to those found in hardwood bleached kraft pulp.

Other remanufacturing operations include Canadian Chopsticks which has a forest licence to harvest 77,000 m^3 of aspen. Finally, two innovative companies have forwarded plans to produce primary and secondary products from birch, aspen and cottonwood. The product lines will include pallet and framing stock, furniture blanks and components, door and window components, flooring and decorative panelling and several other products.

Companies located in the Interior BC that are presently using or anticipating on using hardwoods are listed in Table 2-2.

Table 2-2
Summary of Interior Hardwood Producers

Existing

Company	Location of Facility	Hardwood Products (species)
Canfor	Ft. Nelson	Lumber (As)
Midget Mills	McBride	Lumber (B)
Chu Chua Indian Band	Barriere	Cants (NA)
Dimensional Wood Products	Chase	Cants (NA)
Kenneth Russell Sawmill	Chase Ck	Lumber (B)
Twin River Lumber	Malakwa	Lumber (B,C)
Louisiana Pacific	Dawson CK	OSB (As)
Tackama	Ft. Nelson	Veneer (C)
Tolko	Heffley Ck	Veneer (B,As)
Quesnel River Pulp	Quesnel	Pulp (As)
BWP Millwork	Armstrong	Mouldings, doors, flooring,etc (B,M,A)
Darfield Building Products	Darfield	Log home components
Francois Lake Woodworking	Francois Lake	Panelling, Chopsticks (B,As)
Canadian Chopstick Man. Ltd	Ft. Nelson	Chopsticks (As)

Anticipated

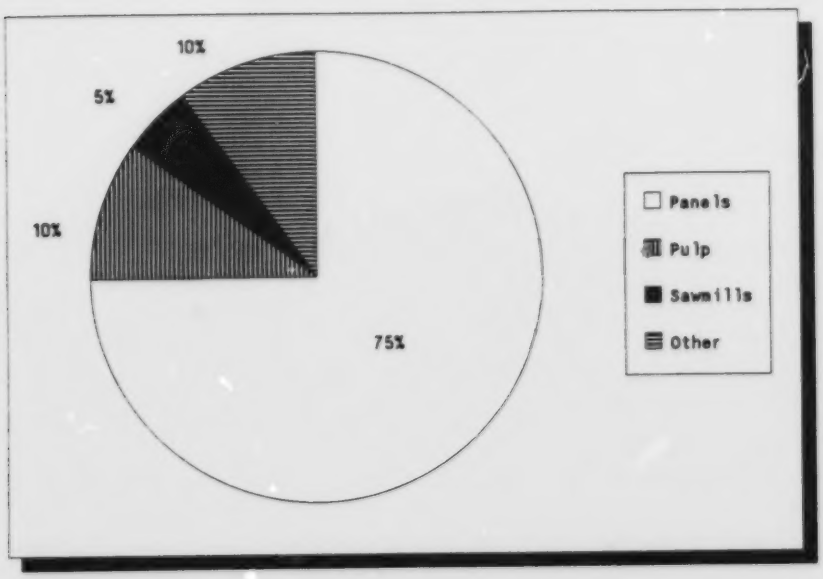
Vanderhoof Pulp & Paper	Vanderhoof	pulp (As)
Fibreco Export Co.	Taylor	pulp (As)
Louisiana Pacific	Chetwynd	pulp (As)
Pacific Green Gold	Prince George	pallets, doors,etc (B,As)
Anonymous Interior Co.	NA	NA
Syncra Wood Products	McBride	Flooring (B)

Notes:
(A) - red alder; (M) - broadleaf maple; (B) - birch; (C) - cottonwood;
(As) - aspen; (O) - other hardwoods; (NA) - not available

Interior Hardwood Log Consumption Mix

Simons' estimates that at least 80% of Interior sourced hardwoods are consumed in commodity oriented processes (i.e. pulp, OSB, veneer, commodity lumber, etc.) with very little processed for the semi-commodity and specialty markets. This is reflected in Figure 2-7. The commodity market will continue to dominate Interior hardwood use, especially considering that much more aspen will be consumed by the BC pulp industry in the near term. However, the volume of hardwoods channelled into the semi-commodity and specialty market is also expected to rise by the year 2000.

Figure 2-7
Estimated Hardwood Log Consumption Mix
Interior - 1989/90



H.A. Simons Strategic Services Division

2.4 PROVINCE

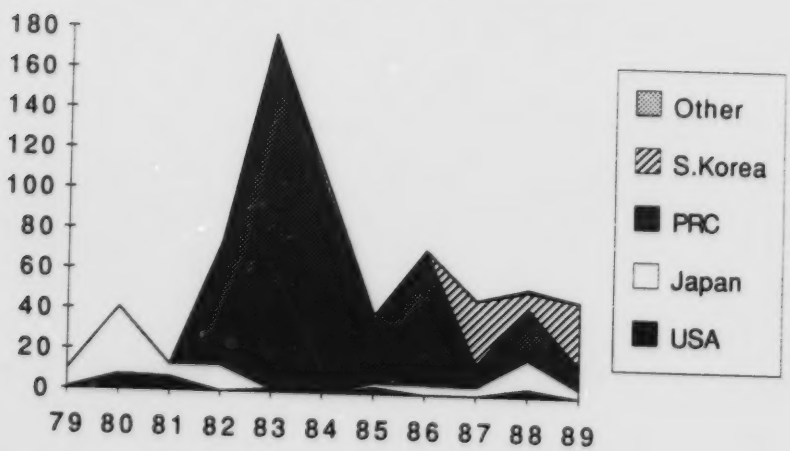
Log Exports

Statistics of hardwood log exports are not separated into Coast and Interior and therefore are discussed here for the entire province.

In some years, the log export market has been important to the BC hardwood industry. For example, in 1983, 56% of total log production was exported, most of which was cottonwood. China has typically been the dominant consumer of cottonwoods but was surpassed by South Korea in 1989. The United States, Japan and S. Korea purchase most of the "other" hardwoods sourced from BC.

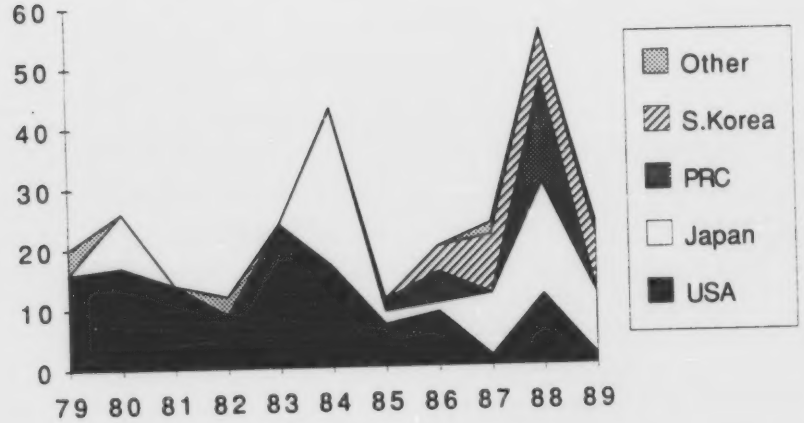
The supplies to these markets have not been consistent, however, as is shown in Figures 2-8, 2-9 and 2-10. BC's log export policy explains some of the irregularity while demand has influenced the sporadic nature of log exports as well. As illustrated earlier, Simons estimates that log exports will remain at approximately 50 thousand m^3 over the next ten years.

Figure 2-8
Cottonwood Log Exports
BC
(thousand cubic metres)



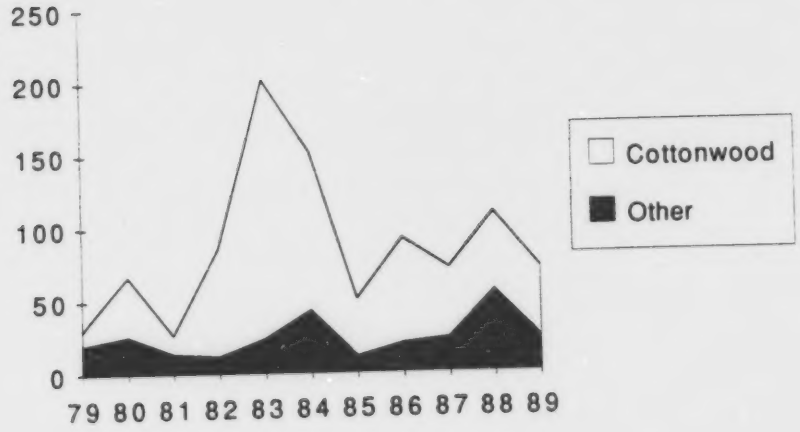
Source: COFI

Figure 2-9
Other Hardwood Log Exports
BC
(thousand cubic metres)



Source: COFI

Figure 2-10
Total Hardwood Log Exports
BC
(thousand cubic metres)



Source: COFI

2.5 US PACIFIC NORTHWEST

Introduction

The US Pacific Northwest hardwood industry has grown significantly in the last five years. The industry initially produced lumber for the domestic furniture industry, and as both the industry and consumers moved along their respective learning curves, PNW hardwood products began to appear in other states and offshore markets. This section presents the profile of the hardwood industry in the Pacific Northwest focussing on Oregon and Washington. Moreover, where possible, the information presented will deal with alder, birch and maple.

Industry Profile

Inventory and Log Production

The stock of hardwood timber in Washington and Oregon has been assessed at approximately 339 million m^3. By comparison, the total BC hardwood inventory was assessed at 325 million m^3. However, unlike BC where aspen is the predominant species, the Pacific NW resource is primarily red alder (see Table 2-3).

Table 2-3
Hardwood Growing Stock Volume In Western Oregon and Washington
(%)

	Oregon	Washington	Total
Red Alder	52	77	65
Big Leaf Maple	16	15	15
Oregon White Oak	5	-	3
Black Cottonwood	-	5	3
Others	27	3	14
Total	100	100	100
Volume (million m^3)	166	173	339

Source: Cintrafor, 1988

The sustainable yield or net annual growth of hardwoods in Oregon and Washington are summarized in Table 2-4. In both Oregon and Washington, red alder produces the greatest growth.

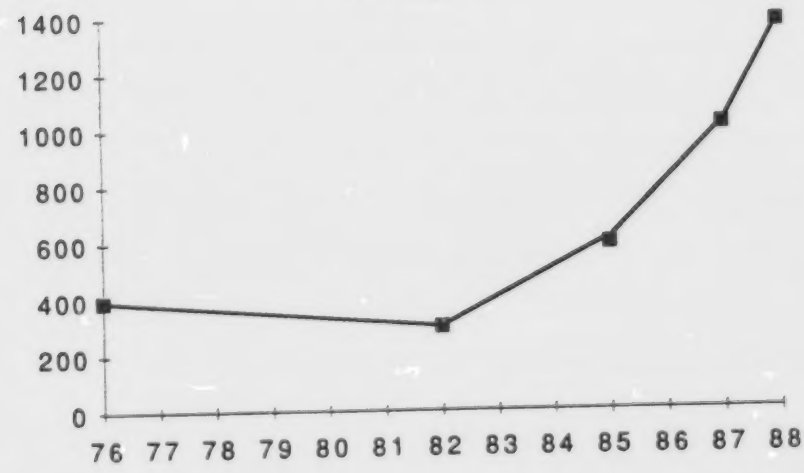
Table 2-4
Net Annual Growth
Washington & Oregon
(%)

	Oregon	Washington	Total
Red Alder	58	79	70
Big Leaf Maple	13	12	13
Oregon White Oak	3	-	1
Black Cottonwood	-	6	4
Others	26	3	12
Total	100	100	100
Volume (million m^3)	5.0	6.5	11.5

Source: Cintrafor, 1988

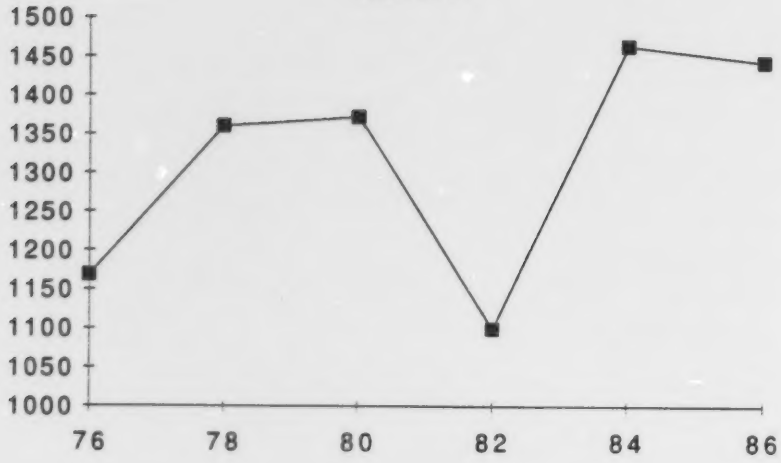
In both Oregon and Washington, the demand for hardwood logs has increased significantly over the last few years, as is illustrated in Figures 2-11 and 2-12. In Oregon alone, log production increased a remarkable 250% over the 1976 and 1988 period.

Figure 2-11
Log Consumption
Oregon
(000 m^3)



Source: Baack, D., 1989

Figure 2-12
Log Consumption
Washington
(000 m^3)



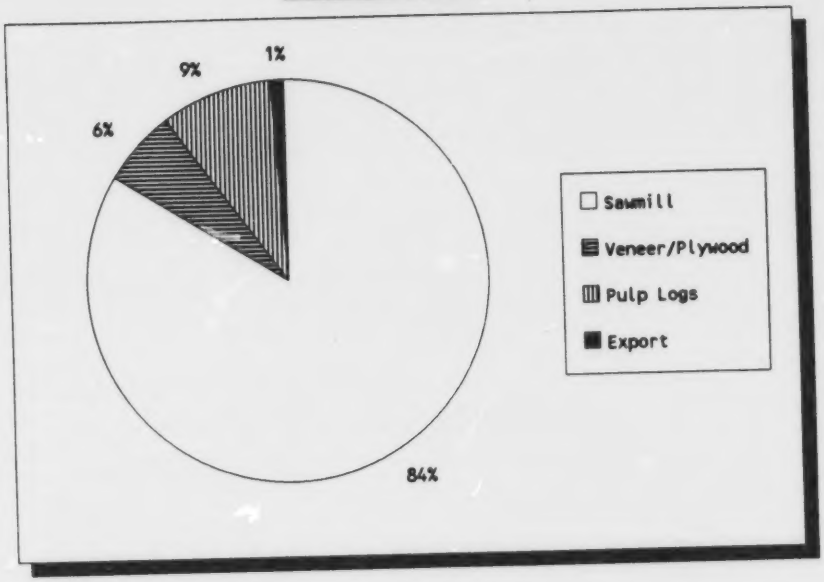
Source: Cintrafor, 1988

Though hardwood log consumption has been increasing, harvest levels have yet to approach net annual growth. The incremental annual volume greatly exceeds harvest levels even when firewood and felled, but unutilized, timber is included in the total harvest level. Underlying these statistics, however, is the often erroneous assumption that the annual growth rate is economically accessible - that these hardwoods can be extracted at a profit. Moreover, like in BC, there is still some question as to the accuracy of the hardwood inventory in the Pacific NW (Cintrafor, 1990).

Primary Manufacturing

At the primary level, most hardwood logs are processed by the sawmilling industry. In Washington, up to 84% of the total logs harvested are consumed by sawmills. This is an increase from 71% in 1971. Veneer production accounts for 6% of total hardwood log consumption, with the export market and pulp market accounting for 1% and 9%, respectively. The hardwood log consumption mix in Washington is presented in Figure 2-13.

Figure 2-13
Log Consumption Mix
Washington State

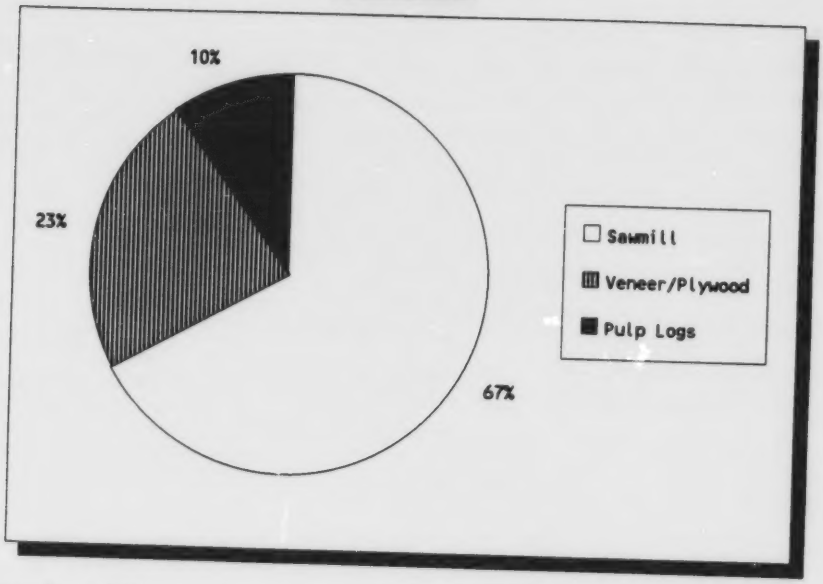


Source: Cintrafor, 1988

The sawmilling sector dominates in Oregon as well (see Figure 2-14). In 1985, 67% of the hardwood logs harvested were converted into sawmill products. Unlike in Washington, a relatively high proportion of hardwood logs are manufactured into veneer and plywood - 23% of the total hardwood harvest. Very little is exported and approximately 10% are converted into pulp products. A more current estimate for the entire Pacific Northwest shows sawmills accounting for 63% of the total, pulp mills 27%, veneer 9% and log exports 1% (Cintrafor, Ref. 3, Appendix D).

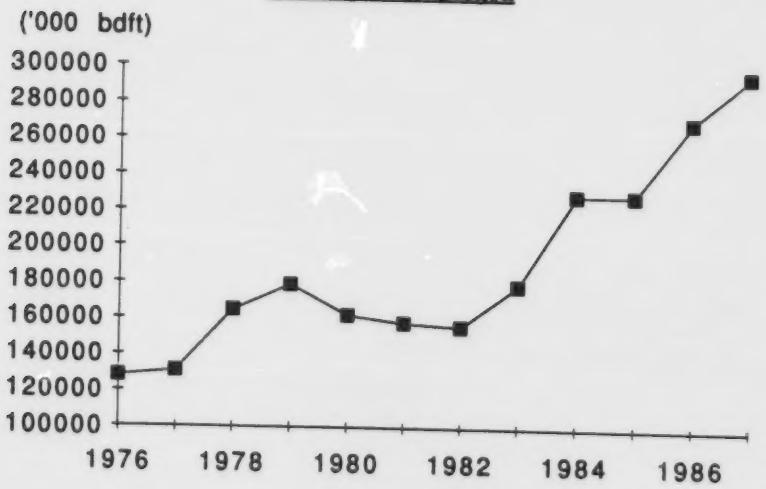
The growth in lumber production in both states proves the success of the hardwood industry, at least the hardwood lumber industry. Hardwood lumber production in the Pacific Northwest has increased from 128 MMfbm in 1976 to 296 MMfbm in 1987, a 131% increase. Figure 2-15 illustrates this expansion. As a percent of total lumber production (combined softwood and hardwood lumber production), hardwood lumber production accounted for 2.9% in 1987 compared to 1.5% in 1976.

Figure 2-14
Log Consumption Mix
Oregon State



Source: Cintrafor, 1988

Figure 2-15
Hardwood Lumber Production
Washington & Oregon

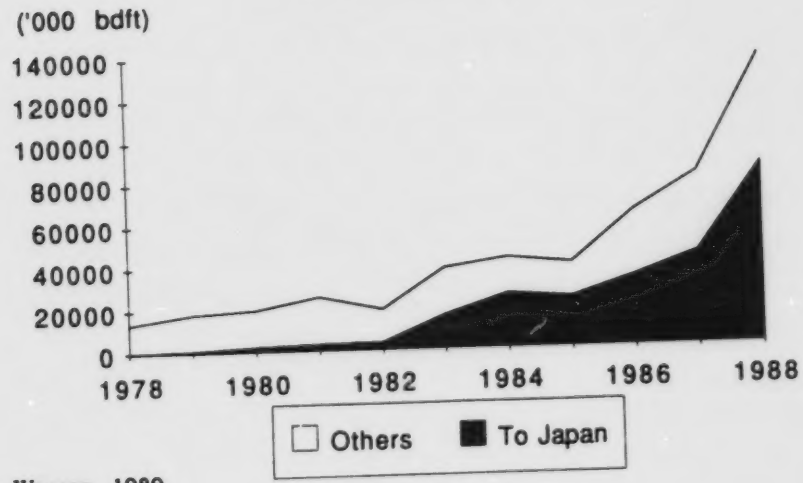


Source: Cintrafor, 1988

Hardwood lumber exports have parallelled hardwood lumber production. Japan's appetite for US produced hardwood lumber, and in particular red alder, has risen dramatically over the last decade. Though increasing their demand for rough hardwood lumber, the Japanese have increasingly favored dressed grades. Japan presently accounts for 73% of the US total alder lumber exports (see Figures 2-16 and 2-17).

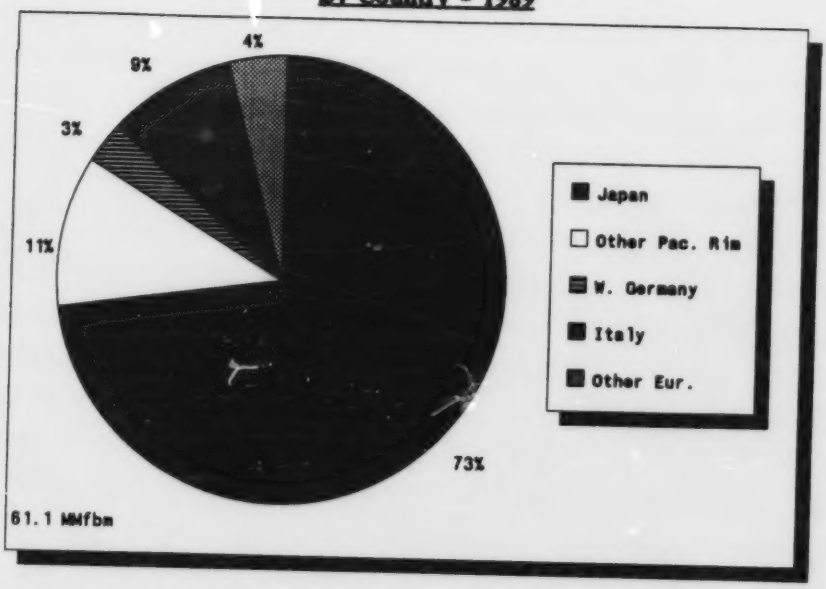
Big leaf maple and other minor hardwood species are being exported to Korea. In the past, however, South Korea has imported more US hardwood logs than hardwood lumber because of the economics of existing tariff barriers (see Figure 2-18). The US has been negotiating with the Koreans to lower or remove these barriers which would pave the way for hardwood lumber exports.

Figure 2-16
Hardwood Lumber Exports
Washington and Oregon



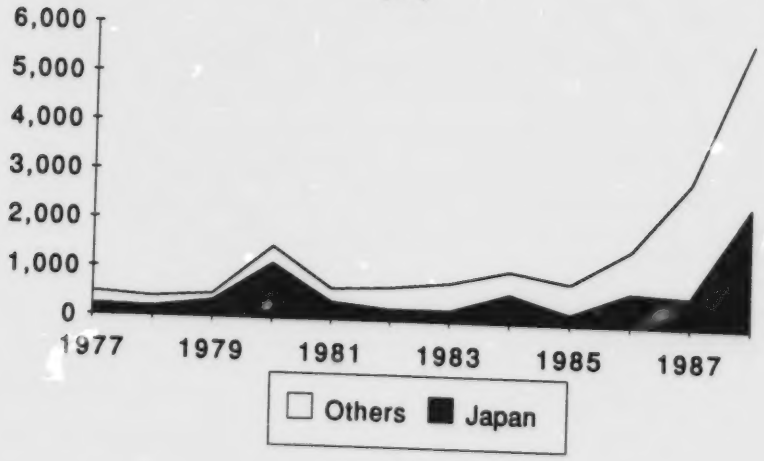
Source: Warren, 1989

Figure 2-17
US Alder Lumber Exports
By Country - 1989



Source: USDA Forest Service

Figure 2-18
Hardwood Log Exports
Northwest US
(m^3)



Source: Warren, 1989

Very little alder, birch and maple is converted into veneer and plywood in the Pacific Northwest. The main reasons offered are: the logs are relatively small in diameter, have punky spots, are knotty, are crooked, and at certain times of the year, contain excess sap (Cintrafor, 1988). Increased plywood and veneer competition from SE Asia suggests that there is little reason to expect any change in the downward trend in plywood exports.

A significant volume of chips is produced from hardwood logs. In 1985, about 1,270 thousand bone dry units (BDU) of hardwood chips were produced, most of which were red alder. Approximately 58% of these were consumed by the US pulp and paper industry and 42% or 535 thousand BDU were exported. Much of the exports were delivered to the Japanese chip market.

Now that Indonesia, the Philippines, and Malaysia have introduced legislation against log and chip exports the Japanese have gone elsewhere for their supplies. Australia continues to be Japan's major hardwood chip supplier, but even this source is in question as this country slowly moves toward domestic utilization. These and other actions have increased Japan's interest in the North American's supply of red alder.

Table 2-5
Japanese Chip Suppliers
1986
(000 BDU)

	Hardwood	Softwood	Total
US	287	1,648	1,935
Canada	13	461	474
Australia	2,107	-	2,107
New Zealand	125	210	335
South Africa	351	-	351
USSR	37	200	237
Other	207	-	207
Total	3,127	2,605	5,732

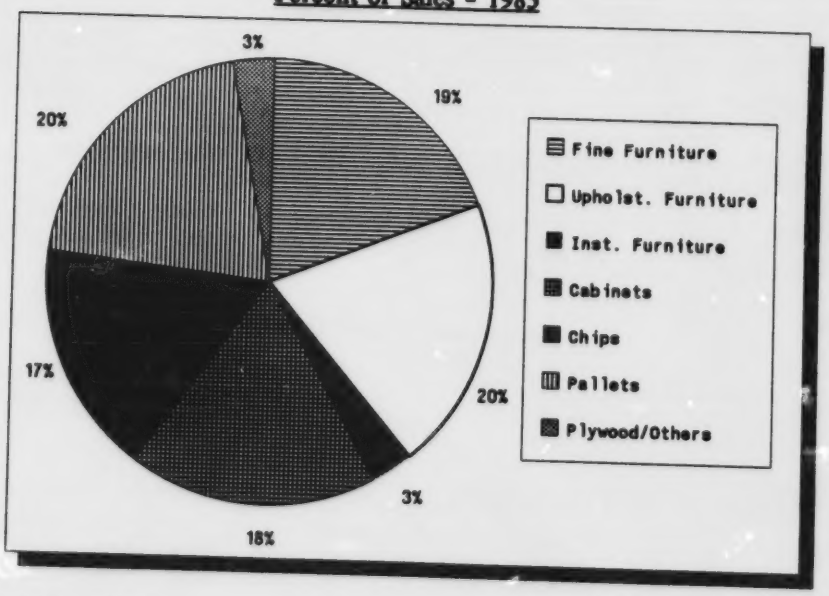
Source: Cintrafor, 1988

Secondary & Tertiary Manufacturing

The use of hardwoods, in particular red alder, has grown in secondary and tertiary facilities throughout Washington and Oregon. This growth has been due to the increased recognition by the Japanese, and more recently by the Europeans, that alder is a lower cost, versatile alternative[1] to a variety of other hardwoods. A number of Pacific Northwest firms, in conjunction with the National Forest Products Association (NFPA) have penetrated new markets and alder is now being used in a wide variety of products.

The public domain statistics do not provide information on market size and distribution of hardwood usage but some work has shown that in 1985 the furniture markets accounted for over 40% of the value (Figure 2-19). The total sales value, estimated at $98 million in 1985, is believed to have grown to $190 million in 1986.

Figure 2-19
Pacific Northwest Hardwood Use
Percent of Sales - 1985



Source: Cintrafor (1988)

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[1] The Japanese have substituted red alder for the indigenous Kaba species, also known as Japanese birch. The Europeans are using alder as a replacement for cherry and fruitwood. (Hardwood review, 1990)

Issues Surrounding the Pacific Northwest Hardwood Industry

In Appendices M, N and O the issues confronting the hardwood industry in the US Pacific Northwest are given. This information was collected by conducting in depth interviews with a primary sawmill and a remanufacturing plant and by including information obtained from recent surveys.[1] One of these studies (Dirks 1990), included a mailing to 634 firms in Washington identified as secondary processors, out of which, 33% returned usable questionnaires. This survey had a section dealing with industry issues and concerns. In Table 2-6, a comparison between the hardwood industry in BC and the US Pacific Northwest is given.

Table 2-6
Summary of Hardwood Sector Comparison: BC and PNW

Issue	BC	PNW
Resource		
Estimated Inventory million m^3	325	339
% sawlog grade	10-20% sawlog grade	About 84% sawlog grade in Washington and 67% sawlog grade in Oregon
Species focus	Predominantly aspen	Predominantly red alder
Accessibility	Poor - few roads and steep slopes	Good - well roaded forests and wider valley bottoms
Standards		
Plywood	BC hardwood not acceptable	US hardwood acceptable
Grading		State-wide & company grading standards employed
Industry		
Health	Essentially stagnant Demonstrable failure rate	Growing and vibrant Significant growth in past 5 years
Number of operators	Small, scattered	Several major producers
Facilities	Few examples of efficient mills	Mills have adopted newer, more efficient technologies

[1] Studies recently completed by Cintrafor and its staff. (Dirks 1990. Buhler & Briggs 1988, Briggs and Buhler 1989, Briggs & Schreuder 1990).

Table 2-6 (Cont'd.)
Summary of Hardwood Sector Comparison: BC and PNW

Issue	BC	PNW
Products		
Out-turn	Sawmills typically produce rough, green.	Sawmills typically produce dry, dressed and graded product; abrasive surfaces; sanding popular for DIY markets.
Veneer	In spite of experimentation, very little utilization.	6% of log consumption in Washington and 23% in Oregon
Lumber export	Limited amount of specialty product to US and Japan. Limited amount of green lumber to US.	73% to Japan. European markets developing (particularly Italy and Germany).
Wood Chips	All exported	58% domestic consumption
Lumber Domestic		
Market	Much of domestic consumption is imported. Markets include upholstered furniture with limited specialty products. Pallets consume some domestic production.	Primary consumption in furniture industry in US West. Strong growth in DIY markets in US West and South. Increasing emphasis on re-manufacturing operations.
Distribution	Product moved through US distributors. Limited volumes sold direct to manufacturers.	Major producers have strong established distribution networks.

Conclusions

Clearly, there are a number of differences between the hardwood sector in BC and in the US Pacific Northwest. With respect to resources, aspen dominates the inventory in BC compared to alder in the US PNW. The other major difference is the quality of the hardwood resources. Higher proportions of sawlog material comprise the US PNW's hardwood inventory as compared to BC's inventory.

Resource availability explains, to some degree, the reason why the alder industry has developed much more rapidly in the US PNW than in BC. What's more, the use of hardwood chips by US PNW industries has further facilitated the growth of the US PNW hardwood industry.

This chapter has set the stage for presenting the issues and constraints that face BC's hardwood sector and the key success factors that could facilitate growth and development in the industry. These are the subjects of the next two chapters.

3.0
ISSUES AND CONSTRAINTS

3.1 INTRODUCTION

This chapter synthesises the information received from industry contacts. The information is presented by identifying the issues for each of the major areas; resource, markets, process, economics, culture and education. The most pressing issues are discussed at the start of each of the sections.

This chapter has been developed to give a potential investor a complete understanding of the barriers that have inhibited success. This investor is also advised to pay attention to those issues highlighted in Appendix P, which present those facing a more mature industry, the US Pacific Northwest.

3.2 RESOURCE

Much of the information presented in this section was obtained from analyzing over forty responses to a questionnaire sent to professional foresters in BC. The overall results of this survey are included in Appendices G through J.

Quality! What Quality and Where Is It? .. (Major Constraint)

There is little information available on the resource quality; rot, decay, age and diameter class distributions, etc., and this dramatically raises the cost of obtaining useful information for any new entrant. More importantly, experienced existing hardwood operators suggest that the quality of alder is extremely site specific and that the percentage of timber of adequate quality to be sawlogs is only 10% to 20% of the total available. One experienced hardwood operator absolutely refused to buy alder logs that originate in certain areas.

Furthermore, log quality deteriorates rapidly as hardwood stands pass maturity. Again existing operators suggested that alder logs beyond the 50 to 60 year age class contained too much rot to be considered sawlogs. This rot can often be difficult to determine prior to processing the log as rot can be introduced through the branches. In some regions within the Fraser Valley alder suffers from ice shear, and has a poor quality that is difficult to detect until the log is processed.

There are few solutions to this information problem. It has been suggested that an astute log buyer who has a good understanding of the alder resource can help overcome this issue. However, due to the limited utilization of this species to date, these individuals are just not available to the new entrant.

Another complicating factor is that, once harvested, hardwood log quality can degregate rapidly over time and alder chips have a short 'storage time'. A common rule-of-thumb calls for an elapsed time of 100 days between the stump and the digester. As alder chip producers have to allow for the shipping time from Canada to Japan, this can significantly reduce the available time for processing the logs. This greatly increases the risk of being perceived as a marginal supplier by the consuming markets. In addition, alder lumber has to be produced within a relatively short time of falling the log. This time period is shorter in the warmer summer months.

Recommendation: *Develop educational material that can be disseminated to industry participants, including new entrants, pertaining to the aforementioned issues. Develop a list of consulting experts available to advise new industry entrants.*

<u>High Logging Costs (Major Constraint)</u>

In portions of the Vancouver, Cariboo and Prince George Regions, hardwoods are being harvested and utilized where local, viable and economic markets exist. However, in portions of these same Regions, as well as in other Regions, the majority of hardwoods within coniferous and scattered hardwood stands are not currently being utilized. The answer as to why some stands are economic and others are not is a complex issue.

Existing alder and birch operators complain about the excessive costs of logs, and the excessive fees asked for by resource license holders. They believe that the high costs of hardwoods are not justified because the stumpage fees for hardwoods are so much less than softwoods ($0.50/m^3 versus $6+/m^3 for softwoods). In addition, hardwood operators suggest that there are little if any incremental costs associated with logging hardwoods, if they are logged at the same time as the softwoods. Based on this argument, they suggest that the price of hardwood logs should and could be reduced as they provide incremental revenue to the logging operation that has already covered its full costs. While this argument may have some merit, particularly in the case of birch logs, it appears to fail in the case of alder in certain coastal areas.

Historic access to the inlets, the sites where alder is likely to grow, has been accomplished by barge. This has meant that BC does not have a road infrastructure into these areas that can be re-used. For example, there are no coastal roads that connect Vancouver to Bella Coola, whereas in the US Pacific Northwest these road networks exist. Sites that have naturally restocked to alder tend to be avoided when logging for softwoods. This means that in many cases, there are substantial costs of going after the alder component and these costs are not incremental to softwood logging operations. The evidence collected indicates that some of the 'best' alder stands are uneconomic to log at the present time.

There are additional costs in harvesting birch compared to a softwood operation. Birch has a lower yield per hectare than softwoods and this increases the costs. Generally the logs are bucked to shorter lengths because of twist and crook. This compounds log handling problems and increases costs. Trucks carry smaller loads because the density is significantly higher, which further increases unit costs. As the material can only be logged during a limited season (excessive sap causes too high a moisture content) existing logging operators require significant incentives to re-organise the operations for the limited operating period.

Recommendation: *Develop cost information on incremental cost associated with logging hardwoods to clear up misunderstanding by existing and potential new hardwood operators.*

Seasonal Pattern of Logging (Secondary Issue)

Birch can only be logged in the winter and fall. First, the high moisture content of birch harvested during the spring and summer, times of high sap, creates downstream drying problems. Second, if birch is not harvested when the softwood component is harvested, it has to be retrieved when the snow cover provides enough 'cushion' so that the young softwood trees are not damaged. The obvious risk of damaging reforested areas discourages winter logging.

This seasonal supply of logs introduces supply disruptions. The birch processor either has to inventory a sufficient volume of logs to carry him through the season or the processor has to educate the market to accept supply disruptions. Inventory costs have to be factored into the business plan, markets would rather switch to alternative species than deal with supply disruptions.

Recommendation: *New entrants must be cognizant of seasonal patterns and the impact of supply disruptions on the alternative of carrying enough log inventory to avoid disruptions.*

Resource Management and Government Policies (Secondary Issue)

This issue has been rated as secondary because present resource management practices merely appear to discourage, and not inhibit, the rate of growth of the industry. Entrepreneurs still try to exploit opportunities, despite clear government policies. It is interesting to note that the US Pacific Northwest industry shares many of the same concerns and clearly the lack of a clear resource management policy has not stopped their industry from growing.

In many areas of the province, hardwoods are considered a weed species not acceptable for restocking. In most areas and on most tenures, with few exceptions, hardwood management policies and management regimes are totally lacking or are directed towards hardwood eradication. For example, on the Coast much of the alder is knocked over and not utilized as a result of site rehabilitation or conifer conversion programs.

If a sustainable hardwood industry is to be maintained, or enhanced, then in certain areas and on selected sites hardwoods must be accepted as a desireable species for restocking and managed accordingly. A land base for the long-term management of hardwoods would need to be established.

Because alder grows along valley bottoms and alongside streams there will be restrictions in many areas to provide for the needs of other resource values such as wildlife, fish, recreation and aesthetics. This would be a very major and serious constraint affecting the continuity and maintenance of the existing hardwood industry, much less any expansion to it. The degree to which this could occur is unknown at this time.

The 80/20 rule, which states that 80% of a forest stand's gross volume must be comprised of hardwood species before it can be harvested under a hardwood licence, constrains the availability of a consistent and adequate supply of hardwood timber in BC. What's more, much of the higher quality hardwood timber is located in mixed stands that do not satisfy this rule.

Recommendation: *Conduct research to determine growth rates, yields and resource quality in selective sites to develop information needed to guide decisions pertaining to the long term management of hardwood. The Hardwood Research program proposed by the research branch of the MoF appears to be addressing this need.*

Volumes, Here Today But Where Tomorrow ... (Minor Constraint)

Although hardwood inventory data is considered inadequate for most Forest Regions and Districts, it is not, in itself, considered a major constraint to current hardwood utilization. However, Ministry of Forests personnel have suggested that there is just not as much alder on Crown lands in the Vancouver Region as most people seem to expect. Classifying hardwoods as 'weeds' seems to suggest that there are vast untapped quantities. This may not be true! The issue of available volume is a minor constraint in the near term, but could be a major constraint in the future.

Specifically, the industry's current annual alder requirements are in the order of 400,000 to 500,000 m^3, whereas the sustainable annual cut, based on current information, may be in the order of 300,000 to 450,000 m^3 (see Appendix I for the calculation).

If a viable hardwood industry is to be established and maintained, then an accurate, reliable hardwood inventory is absolutely essential. This inventory is required in order to acquire the basic data necessary to properly manage the resource and answer such basic questions as:

- How much mature volume actually exists, and what is its quality and log size distribution?
- How much immature area is there, and what is its stocking and age class distribution? The success of the current eradication program (such as the 'hack and squirt' program) may have resulted in insufficient material in the under 30 year age class. If this is true, then existing alder operations may run out of resource within the next two decades.
- How much of the mature volume and immature area is actually available for management, after 'netting down' for integrated resource management considerations?
- What is the sustainable annual cut?
- How big of an industry can the hardwood resource sustain? Is there room for expansion?

Much of today's 'knowledge' is based on opinion and perception and the answers to all or most of the above questions are not known. Accurate and reliable data is required in order to formulate proper management objectives, policies and regimes. The hardwood work program proposed by the research branch of the MoF seems to be meeting this need.

Recommendation: *Same as recommendation for Resource Management and Government Policies conduct necessary research to guide a decision on undertaking a hardwood inventory program.*

3.3 MARKETS

Good High Grade Markets .... Limited Falldown Markets (Major Issue)

There is a strong and growing market for high grade alder lumber as well as semi-finished and finished components for the millwork and furniture industries. Significant demand has been developed in the US and Japan. Furthermore, markets for the specie are emerging in such countries as Italy and Germany. Although the demand for this material was developed over a period spanning more than two decades the greatest growth in demand has occurred during the last few years.

These markets were developed for raw material being harvested in the US North-west and markets for birch have not been developed to any great extent due to the limited availability of a quality birch resource from this region. However, limited market testing indicates that potential markets do exist for the upper grades of birch.

The domestic demand for the medium and lower grades of hardwood are limited. While the high grade/high value material can bear the transportation cost to distant markets the lower grade/lower value material cannot. Thus the lower grades are targeted to local markets where the limited market demand depresses prices for these grades.

Several users or potential users have identified the following points as drawbacks surrounding birch usage:

1. birch is extremely knotty, reducing clear recovery volume from ripping and cutting operations;
2. if not dried properly, thin strips of birch will warp again reducing recovery;
3. because of the higher density of birch wood, upholstery stapled to white birch is difficult to remove during repairs compared to that stapled to alder, lending to higher material costs and more labour handling;
4. insufficient supply of kiln dried birch.

Recommendation: *Inform new entrants of the situation that currently exists concerning falldown markets. Conduct market research to identify potential markets for falldown. Identify opportunities to upgrade falldown through remanufacturing operations.*

No Domestic Chip Market (Major Issue)

No domestic market for alder and birch chips is in place. Pulp companies and other potential users of chips have not used hardwood chips primarily because of the lack of a consistent and adequate supply and, perhaps more importantly, because their needs have been satisfied with readily available softwood chips. This coupled with an insufficient inventory of hardwoods has meant that hardwood chip producers have had to turn towards export markets.

As in the softwood sawmilling industry, a chip outlet is necessary for the long-term survival of a hardwood lumber producer. The by-product market is very important to the success of a hardwood operation. The key is to establish a long-term market for these by-products and honour that long-term relationship by meeting the needs of the buyer, which in many cases may be the Japanese. Unfortunately, most primary mills are too small to supply enough product on a economical basis. Consequently, other routes must be taken such as combining the by-product output from more than one operation or perhaps selling the chips indirectly to the end-user through a large established operation or a broker.

Narrow profit margins will continue to mar some satellite chipping facilities. Alder chip prices have recently softened making most satellite chipping facilities unprofitable. Only under unique relationships and circumstances can an independent hardwood chipping facility stay profitable over the long-run. Diversification is the key to minimizing this susceptibility and can be achieved as follows:

1. chip both softwood and hardwood species;
2. if production capacity is large enough, produce for more than one market (e.g. Japanese, US and domestic; pulp industry, reconstituted board industry, etc);
3. integrate into primary and perhaps secondary manufacturing (see Chapter 4).

Development of a domestic industry that utilizes hardwood chips would go a long way to making a small hardwood venture viable. Offshore demand for hardwood chips is growing. However, in export markets BC functions as a swing supplier of hardwood chips - being among the first to experience cut backs when chip markets soften. Domestic demand should also increase in BC as pulp firms recognize the benefits associated with using some hardwoods into the furnish without jeopardizing the pulp's strength properties. A small portion of hardwood chips are incorporated by a number of mills simply to add brightness to the pulp.

Recommendation: *Explore alternative end use market opportunities such as animal bedding, pelletized fuel, etc. Conduct marketing research as required. Hardwood chip cooperations could be established but the financial feasibility of such an alternative would have to be investigated.*

Specialty Mentality is Critical .... (Major Issue)

Producers must be responsive to the buyers' needs to succeed in high value hardwood markets. One major reason many hardwood producers have failed is because they do not fully understand and meet the needs of the buyers. A supplier will be retained on a long term basis only if they consistently meet the product and service requirements established by the end-user. In many hardwood applications the Europeans and Japanese demand product specifications with very narrow tolerances. Critical issues include, but are not limited to size tolerances, drying, colour, delivery schedules, packaging, etc. The producer's inability to satisfy the end-user's needs can limit growth and profitability. A brief lapse in the level of service and quality of product delivered can seriously jeopardize a market that took considerable time, effort and resources to develop.

Semi-specialty and specialty products cannot be successfully manufactured with a commodity mentality. The high value markets for alder, birch and maple are not in the commodity spectrum and these species are not well suited for building construction applications. Although some producers are converting BC's hardwoods into commodities such as core veneer, chips for pulp, or reconstituted boards, this is being done in conjunction with softwood production and/or at an economy of scale. The trade off between high volume output and high quality (at the expense of volume) is an important consideration for hardwood operations targeting the high value markets.

There is a large number of product opportunities available to the remanufacturing industry. There is a trend among wood manufacturing groups such as furniture manufacturers, seeking to save labour costs and freight and reduce raw material wastage, to purchase more materials in semi-finished form from clearcut selected stock to components such as furniture, door and window. Many of the opportunities available to the hardwood industry are listed in Appendix L, with a summary of the product opportunities outlined in Table 3-1 below.

Table 3-1
General Listing of Hardwood Species Niches

	Opportunities by Market Segment[1]		
Application	**High**	**Medium**	**Low**
Furniture, framing	maple	alder	birch
Furniture, appearance	walnut	oak, birch, maple	alder
Mouldings	exotic hwds	oak, mahog.	alder
Turnings	maple, hick.	oak	alder
Panelling	exotic hwds	alder, birch	aspen
Flooring	oak	birch	
Edge glued	maples, walnut	oak	alder
Cabinetry	exotic hwds	oak	alder
Toys	maples, walnut	alder, birch	alder, birch[2]
Pallets	all hardwoods but price sensitive		

Source: H.A. Simons Strategic Services Division

1 Market segments definition:
- high: commands high price premium
- medium: widely distributed and in demand by middle income
- low: mass merchandising outlets

2 grade dependent

Recommendation: *Educate industry participants as to the true meaning of a specialty mentality and how important it is to achieving success.*

Distribution Channels are Critical (Major Issue)

An effective distribution system is important in developing and maintaining a successful hardwood operation. However, the channels of distribution and associated service requirements can vary significantly depending on a number of key factors including:

- The Level of Product Manufactured
  - S2S, S4S, clear cut stock, edge glued and/or finger jointed blanks and fully machined components for furniture and millwork applications

- End Use Industries
  - household furniture, commercial furniture, do-it-yourself home centre, kitchen cabinets, etc.

- Geographic Markets
  - United States, Japanese export, European export, etc.

Strong distribution networks have been established to serve select market segments and some markets require their suppliers/distributors to provide special services. For example, many home centre chains require their supplier to deliver product to each store and some require bar coding, checking and replenishing stock on a regular basis, etc. Unless a new producer has unique motivating reasons and/or significant resources, it is advisable to initially utilize established distribution channels and distributors with a successful track record.

Recommendation: *Unless a new producer has unique motivating reasons and/or significant resources, it is advisable to initially utilize established distribution channels and distributors with a successful track record.*

Restrictions on Log Exports (Secondary Issue)

The log export markets provide an outlet for low quality hardwoods but this is not viewed as a growth market. The British Columbia Forest Service's policy with respect to log exports is that raw logs can only be exported if they cannot be utilized domestically. With the growing interest to process BC's hardwoods domestically, very little of the total hardwood harvested will exported offshore as raw logs. Also, there are increased pressures to reduce log exports because of the perceived lost jobs and revenues.

Nonetheless, some producers use the export market to generate cash flow from some of their low quality logs. Furthermore, some high quality alder sawlogs have been exported for processing in the US but a recent conversion of a BC softwood sawmill to cut hardwood lumber has created a Canadian demand for this resource. The US demand for alder sawlogs will likely increase placing upward pressure on prices. Prices recently bid by US producers were roughly 50% higher than that paid by the Canadian mill. Such a price differential should enable the Canadian mill to effectively compete in the growing market for high grade alder lumber assuming there is an adequate supply of domestic sawlogs.

Recommendation: *Continue existing log export restrictions to protect BC hardwoods operations.*

Other Product Options Exist for BC Hardwoods (Minor Issue)

Hardwoods are being peeled as an inexpensive substrate but the market opportunity is considered to be quite limited. A small quantity of alder is currently being peeled and used for inner plys for plywood that is being exported to the US. In addition, a small amount of cottonwood is being peeled for this application. Aspen and birch veneers are also being evaluated for plywood inner plys. High priced softwood stumpage is the major reason for utilizing and/or evaluating hardwood veneer. However, COFI standards currently only allow the use of 5% mixed hardwood species for Canadian markets.

Although reconstituted boards, such as MDF and OSB, could provide an additional outlet for low grade hardwood material, this is not considered to represent a promising market opportunity for BC hardwoods. Since 1980, the demand for OSB has grown exponentially. US production of OSB increased 26 fold from 1980 to 1989 (from 196 MMSF to 5,105 MMSF - 3/8" basis). During the same time Canadian production of OSB/waferboard increased four fold (from 616 MMSF to 2,450 MMSF - 3/8" basis). In 1989 56% of the Canadian production was exported, primarily to the US. US production is projected to increase an additional 50% more by 1995.

Construction of a MDF or OSB mill to utilize BC hardwoods would not have any particular advantage over existing MDF and OSB operations and in fact would be at a competitive disadvantage in many instances with respect to raw material source and proximity to major markets.

Recommendation: *Monitor developments for other products on a minimal effort basis.*

3.4 PROCESS

Management is Crucial and Technology is Available (Major Issue)

Skilled management of the manufacturing process, associated technologies and the product mix is an essential element to the success of a hardwood operation. Even minor variances in specified tolerances, recovery rates and product mix can mean the difference of being profitable or unprofitable. Furthermore, proper management of the product mix is critical. Some producers have accepted orders for very high priced items only to later realize producing the product develops a disproportionate volume of off-grade material yielding a low value and resulting in an unacceptable average price for the total product mix.

Technology currently exists to meet the demanding requirements for high value markets. This is evidenced by the high value markets in Japan, Europe and the US which have been developed and served by US alder producers (i.e. 45 MMBF of alder was exported to Japan in 1989). Currently, edge glued clear grade alder furniture blanks are being sold into this market at over US$2,000/MBF FOB mill price).

Obviously the type of equipment required and the associated capital investment can vary significantly depending on the quantity and quality of raw material processed and the degree of processing and the product requirements for targeted market segments. However, some small remanufacturing operations have been able to successfully produce products for some very demanding high value niche markets with relatively small capital investment. In serving markets for high value hardwood lumber it is important to recognize special manufacturing processes may be involved. For example, select market segments have shown a preference for abrasive sanded surfacing for high grade alder lumber versus planed surfacing for commodity material. Furthermore, the importance of proper kiln drying and conditioning cannot be over emphasized since this process can significantly affect dimensional stability, colour, gluing properties, grade recovery, etc.

Recommendation: *Develop and maintain a list of sources new entrants can access for insights pertaining to management and technology in the hardwood industry.*

With Respect to Kiln Dried Hardwoods, Demand and Supply Are Not In Balance

The BC demand for kiln dried hardwoods outstrips the local production of KD material. Several remanufacturers in BC have used kiln dried softwoods or kiln dried hardwoods sourced out of Eastern Canada, the US Pacific Northwest and the Eastern United States because they cannot get a reliable supply from BC primary producers. This is particularly true for alder and birch. Many remanufacturers in BC have not been convinced that there is enough domestic production of kiln dried hardwoods or that existing producers have the maturity to meet their needs to justify use of these species.

Kiln drying of hardwoods is significantly more difficult than softwoods. Kiln schedules needed to minimize downgrading hardwood are typically 12 to 15 days in duration. End users typically specify moisture content ranges of 8-12% to ensure stability and to permit gluing and staining. Production volumes and hence kiln sizes tend to be considerably smaller in hardwood processing than in softwoods. Remanufacturers frequently undertake kiln drying to ensure quality control rather than entrust this important process to the primary sawmill. Similarly the tertiary user, such as a furniture plant, frequently will undertake a final steam-conditioning prior to final processing. Dehumidification style kilns are gaining acceptance for gentle yet energy efficient drying of hardwoods.

Recommendation: *Flag this situation for new entrants into the industry.*

3.5 ECONOMICS

Limited External Sources of Funding Available (Primary Issue)

The lack of historical data and precedent in the hardwood processing sector inevitably increases the perception of 'high risk'. High risk funding sources, i.e. venture capital, are often not attracted to this industry because there are very few exit alternatives. A key criterion used by venture capital funds is to ensure that there is a clearly defined exit within a three to seven year time horizon. As there are limited, if any, potential purchasers for hardwood operations, venture capital funds do not find this type of investment attractive.

The potential investors frequently underestimate the amount of development capital required to bring a project to the financing level. The time needed to bring a well researched request for funding to a potential capital source may take one to two years from the initial concept. Although the scale of a hardwood project is small in comparison to the softwood sector ($3 million versus $10 million plus) more rather than less data has to be collected in order to overcome the higher perceived risk.

All of these comments highlight the fact that the entrepreneur generally has to fund the project to a level where a professional business plan can be presented. External sources of funds may be available at this stage, however the process of obtaining these funds can be long and arduous.

Recommendation: *Advise potential new entrants of this situation and provide them with a check list of information required to support investment proposals.*

Production Economics (Primary Issue)

Five potential investments that could be suitable to process BC hardwoods were examined. These investments are as follows:

1. Hardwood chipping facility
2. Integrated chip/primary facility
3. Lumber facility
4. Remanufacturing facility
5. Integrated primary/remanufacturing facility

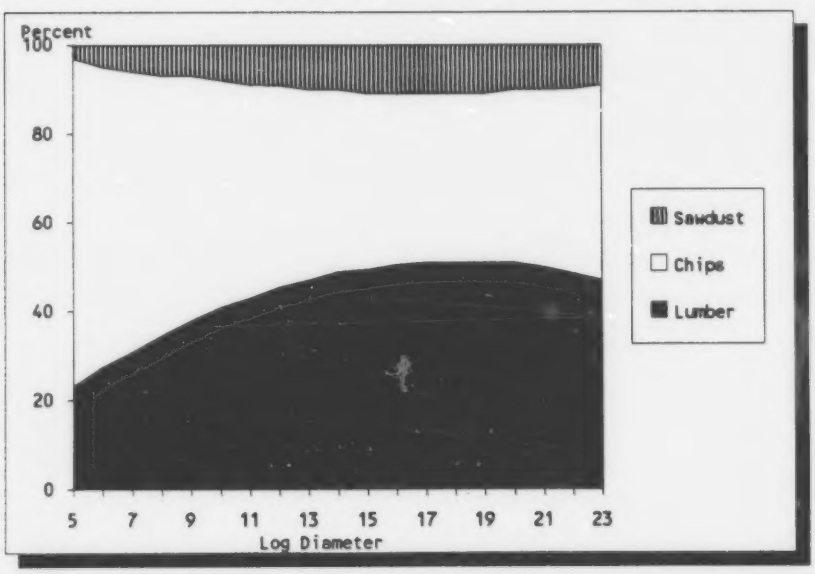
The detail analyses of these investments are provided in Appendix P, with the salient findings provided here.

The economics of the first three facilities were very sensitive to log costs and lumber and chip prices. This sensitivity decreased, however, as the level of processing increased and through vertical integration.

The success of the primary operation is also a function of the firm's ability to sell its chips, the grades of lumber produced, the economies of scale achieved and whether or not the facility has kiln drying capacity.

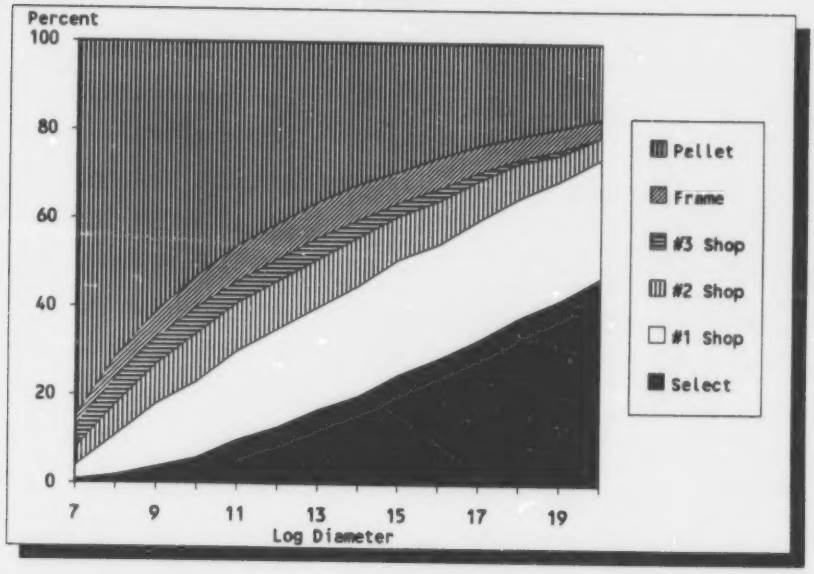
Most primary facilities in the US Pacific Northwest are capable of producing a range of products. The mix is governed by the quality and size of the logs and the market activity for those grades. In their work in the Journal of Forest Products, Plank, M.E. et al (1990) showed that for alder both lumber volume recovery and lumber grade recovery increased significantly as log diameter increased to a limiting diameter around 18 inches. Above that diameter the impact of the more numerous saw-lines, combined with the declining log grade with diameter causes log recovery factor to decline (Figures 3-1 and 3-2).

Figure 3-1
Log Diameter Versus Lumber Quantity Recovery
Alder



Source: Plank, ME et al (1990)

Figure 3-2
Log Diameter versus Lumber Grade Recovery
Alder



Source: Plank, ME et al (1990)

Further movement up the value chain (movement from primary into remanufacturing) and/or integration of primary with remanufacturing could lead to less cost and price sensitivity and/or a greater cash flow.

Recommendation: *The new entrant must fully understand the product processing costs, the sensitivity of rates of return to changes in costs, the trade-offs and the risks.*

Labour Rates (Primary Issue)

Interviews with those in the hardwood processing sector confirmed that managing the business, was usually a question of managing for survival. Most small businesses are managed on a cash basis and labour is one of the few variable costs that a plant has control over.

The experienced operators confirm that labour cost is an important variable and could certainly inhibit investment. Perhaps more importantly, high labour costs can make a significant difference to finding markets for the lower grades of products. As was discussed in Section 3.3, any barrier that inhibits access to markets for low grade products is viewed as a significant issue.

Recommendation: *The impact of labour rates on the viability of new hardwood operations must be identified.*

Residue Disposal Costs (Secondary Issue)

Small scale producers, both primary and remanufacturers, have real costs associated with removal and disposal of their waste products such as bark, kiln-dried trim ends, and sometimes chips. One the one hand, they do not produce these residues in sufficient quantities to sell economically, and on the other hand traditional disposal methods such as burning or burying are rapidly being outlawed. Although this is an important issue, it is not considered a primary issue by existing operators as they have solved their particular problems.

This problem can be compounded as chip discoloration, due to oxidation and bacterial action, within sixty days of production can rapidly erode the value of any chip pile. Local markets for animal bedding or energy are limited, and often present a least cost alternative to the manufacturer.

This problem is not limited to the hardwood sector, and is a real barrier to the emerging softwood BC remanufacturing sector. A solution to the problem will require industry co-ordination and is certainly beyond the capabilities of any single operator. At this time, solutions are still needed.

Recommendation: *Explore possible end use market opportunities such as pelletized fuel, animal bedding, etc.*

3.6 CULTURE AND EDUCATION

Supplier Must Be Responsive to the End Users Needs (Major Issue)

To compete internationally, the culture of the end-user must be taken seriously. The semi-specialty and specialty forest products market, and even parts of the commodity markets, are not controlled by the producer. The buyer has become increasingly demanding concerning product and service requirements. This is not only true in North America but is very prevalent in international markets. With the globalization of the economic markets, the buyer now has more of a choice so when its needs are not completely and unconditionally satisfied it will seek out other suppliers.

Understanding the behaviour and the culture of international buyers and investors is a key ingredient for success. Although it may be possible to initially target just the domestic market, as competition increases it becomes increasingly difficult to survive based on this market alone. Penetration of offshore markets requires an in-depth understanding of the unique aspects of these markets and the needs of the end-user.

Coordination between buyer and seller will improve the probability for success. Currently there is very little coordination between the needs of the hardwood supplier and buyer in BC. For instance, when the primary manufacturer has a supply of BC sourced hardwood lumber, the remanufacturers are in need of another species and visa versa. Both sectors have reacted by reducing or eliminating production or use of BC sourced hardwoods.

This problem can be converted into opportunities by:

1. establishing a long-term relationship between the supplier and buyer, or
2. establishing a vertically integrated operation.

The successful hardwood operations in existence in BC today have a close tie and relationship with its suppliers, many of which are located outside BC.

Recommendation: *Suppliers are advised to maintain close contacts with end user to fully understand and meet their needs.*

Long Term Commitment Required (Major Issue)

Firms must recognize that success in the semi-specialty and specialty markets emanates partially from "learning-by-doing" and a long-term posture and commitment. They must avoid the commodity/volume mentality that prevails through much of the softwood industry. When dealing with the semi-specialty and specialty markets, a firm must be willing to spend time cultivating its markets and establishing a reputation for quality. In addition, it is important for the firm to recognize the learning curve associated with the products it is producing, the raw materials it is using, the technology it is employing and the markets it is exploring. In time efficiencies should be gained as more is learned about these areas. However, instant success is unlikely and if the firm is does not understand or is unprepared for this eventuality the probability of success is reduced.

The duration of the learning stage can be shortened in a number of ways:

1. Research - if all dimensions of the project have been examined and analyzed prior to production, less learning will be required during production.
2. Skilled labour - using labour or management that has worked with hardwoods or/and has sawed or remanufactured hardwoods will reduce the learning process. In order to achieve maximum value from the hardwood log or board, labour skill is required.

Recommendation: *Educate industry participants - time must be considered as part of the investment required to achieve success in specialty markets. Ensure working capital is adequate to withstand long development time.*

Trial and Error Can Be Expensive! .. (Major Issue)

Thorough market research is a key ingredient for success. Identifying and developing a market is not easy and should not be over simplified. The primary markets and key potentia. buyers for all product grades to be produced should be identified and evaluated preceding any major capital investment. Production and sales from a mill focussed on quality will inherently be slow at the beginning while the producer builds its reputation and improves efficiencies.

Recommendation: *Industry participants should conduct marketing research into customer needs, market trends, competitiveness, etc.*

4.0
KEY SUCCESS FACTORS

In the preceding chapter, the major issues and constraints engulfing BC's alder and birch industry were presented. In this chapter the key factors that are necessary for success are prioritized. Before proceeding, it must be fully understood that the economics are only one variable in the hardwood equation and hence an attractive venture means very little if the capital cannot be raised, the fibre does not exist or if there are no markets.

Hardwood Equation

Resource +

Markets +

Economics +

Financing +

Technology +

Culture

= SUCCESS

Key Success Factors

A secure resource supply is critically important for success. Harvesting of hardwood is primarily driven by coniferous log production and as a result the hardwood log supply is dependent on the economies of the coniferous industries. Furthermore, even when logging activity is "high" the volume of hardwood may remain low depending on the area being harvested. Success is dependent upon establishing a relationship with a TFL owner for a consistent and adequate source of supply at competitive price levels.

Success is heavily dependent on the ability to market the full product mix obtained from the available resource. While a portion of the product mix may carry a high value it is necessary to develop markets for lower grade products, falldown grades and byproduct chips. Market research should be conducted to identify market opportunities for the full product mix.

Strong financial backing is critical to carry an emerging company past the start-up phase and through a reasonable period of market development. Unfortunately, many starts do not have sufficient funds to survive the inevitable learning periods and the time required to establish a reputation in the market.

A marketing orientation is an essential ingredient for success. This includes maintaining close contact with the market and being responsive to market requirements.

A "hardwood corporate culture" that is supportive of specialty products and niche marketing is important. This encompassed such important aspects as:

- producing for grade recovery rather than volume;
- flexibility, responsiveness and commitment required to serve niche markets;
- recognition that hardwood niche markets take time to develop.

Senior management must be committed to establishing and supporting this philosophy at all levels of the organization. Successful hardwood operations are generally small in size compared to many softwood operations, which is a contributing factor in achieving and maintaining the "hardwood culture".

A stable and dedicated labour force is an important ingredient for success. This is especially true when the customer's specifications may be both demanding and unique and margins are extremely sensitive to recovery rates. The ability to compete for labour with the level of skills desired could be enhanced with a benefit package that includes some form of incentive pay.

Kiln drying capacity is needed for the success of sawn hardwood operations. Since the softwood industry in BC doesn't have excess kiln drying capacity and recognizing drying schedules as different for hardwood and softwood, hardwood operations should construct their own kilns or have access to a shared kiln.

5.0
CONCLUSIONS

BC Industry

* Growth in the BC alder industry is limited by resource availability. Existing operations already consume more than the estimated AAC from crown lands. New entrants could have a significant impact on log costs for the entire industry as resources could become strained.

* Maple and birch consumption will require either mixed softwood/hardwood mills or the establishment of a seasonal operation. Existing birch capacity is well below estimates of the estimated birch AAC. There are no established markets for birch falldown products.

US Pacific Northwest Industry

* The industry in Washington and Oregon is mature and serves global markets. This industry will continue to dominate the BC industry by setting market standards and prices. Many of the issues facing this industry are similar to those facing the BC industry.

Resource

* Resource quality is the major uncertainty facing the new entrant.

* High logging costs make much of the 'high grade' resource un-economic.

* The colloquial terminology "weed-species" conjures up the false image of untapped and abundant resources.

* To ensure future supplies for the existing operations critical resource issues need resolution. Realistic and proper management policies, objectives and regimes should be implemented to balance the demands put on the existing resource. A hardwood inventory is necessary at some time in the future.

- Even experienced operators are unable to correlate between external pathological indicators (such as bracket fungus on the bark) and grade yields of that log when sawn.

Markets

- Adequate and demonstrable markets exist for upper grades of BC's alder, maple, and birch. Kiln drying capability is a critical success factor.

- There are no domestic chip markets for alder, birch, and maple.

- Lower grades find an outlet in pallets and packaging, albeit subject to extreme price competition.

- There is a lack of market opportunities for the spectrum of low to middle grades (typified as framing or No. 3 shop grades). Competition from other suppliers and species reduces the effective radius for the BC industry.

- A small group of BC tertiary producers, who assemble furniture, are unable to obtain their hardwood requirements from BC sources. BC manufacturers are limited in their capability to supply this type of customer as: they have difficulty locating markets for the inevitable falldown products; and they become captive to a small group of end users.

Processing

- Skilled management is a critical success component. Proper product costing is an essential ingredient; many operators have found they have underestimated the cost of production.

- While resource scarcity mandate a combined facilities to process birch and maple, it is not desirable for alder.

Economics

- Three options - a chip plant, a combined chip plant and primary mill, and a combined primary mill and remanufacturer - out of the five analyzed show an after tax return on capital greater than 15%. However, these returns may not be high enough to attract capital particularly when weighed against the perceived risk of this industry segment. In addition, the chip plant option is extremely sensitive to rising log costs.

Education and Culture

- Thorough market research is necessary. This must include a thorough understanding of the end users' culture.

- Instant success is unlikely. Success evolves from a long term commitment.

New Entrant Checklist

- As little public data exists on the BC hardwood sector's past performance or markets the time necessary to prepare a business plan to attract capital can be lengthy. New entrants have to ensure that they can internally fund this activity.

- The answers to the questions asked in the sample check list (see Appendix F) should be a mandatory part of any business plan prior to seeking funds.

6.0
RECOMMENDATIONS

6.1 ALDER

Do not encourage any additional alder facilities until..

The current sustainable harvest from crown land is estimated to be approximately 300,000 to 450,000 m^3/year. Current industry demand is between 400,000 and 500,000 m^3/year.[1] Clearly, considerable volumes are being extracted from private land or cuts on Crown land exceed the AAC. If this is the case, the alder industry will face a resource sustainability problem in the future.

During the interviews, it was apparent that the supply and hence the price of alder is highly influenced by each additional demand put on the resource. Each new entrant has significantly impacted on the market. This suggests that the economic supply of alder is approaching its limits.

No additional hardwood licenses should be awarded until the sustainability of the hardwood resource can be better determined.

If existing operations fail (at the time of report preparation, Discovery Hardwoods was placed in receivership), their license should be re-allocated to existing operators <u>if other operators cannot be found for the failed asset</u>. This re-allocation could be done by competitive bid, in a process similar to the Small Business Forestry Enterprise Program (SBFEP), that would only be open to existing hardwood operators.

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1 This estimate includes the volumes once utilized by Discovery Hardwoods.

6.2 BIRCH

Evaluate on a case by case basis

Birch operations will probably evolve as combined hardwood/softwood operations. Birch is too widely scattered throughout the forest land base to support an economy of scale birch operation.

If and when individuals come forward with plans for a birch operation, the plans should be scrutinized to determine that the falldown markets have been addressed. Most operators that have failed have not addressed this issue. Licences and support should not be awarded unless this critical aspect is addressed.

6.3 FUTURE ACTION

Before suggesting future policy actions, it is interesting to compare the coastal hardwood industry to the coastal softwood industry. Table 6-1 shows comparative data for the sawlog component only. This table does not include potential chip production values as there is no current BC market for alder chips and inclusion of comparative chip values would be misleading.

Table 6-1
Comparison of Coastal Hardwood and Coastal Softwood Industry

	Softwoods[1]	Alder[2]
Estimated value added ($/m^3 of input)	$50-60	$80-90
Estimated sawlog consumption (million m^3)	17.8	0.1
Estimated lumber production (billion fbm)	4.1	0.02
Estimated total value added ($ millions)	$900	$9

Notes:
1 Simons estimates for coastal industry sawlog consumption. Statistics Canada statistics used for total value added.
2 Value added calculation is for lumber component only (see Chapter 4). Sawlog consumption assumes that 15% of alder resource is sawlog material.

This table clearly illustrates that the hardwood industry will never be as important as the softwood industry in terms of total production and value-added. In fact, the hardwood industry will only account for approximately 1% of the softwood value added contribution, and just over 0.5% of the sawlog consumption. Faced with these statistics, and keeping in mind the fact that there may be problems sustaining the existing industry, the reader may ask the question: "why bother with the hardwood industry when the potential is so limited?" Three possible answers are suggested.

* First, the hardwood industry contributes more value on a cubic meter basis when compared to the softwood industry. Carefully maintaining and growing this resource reinforces society's general wishes to extract more value from the available land base.

* Second, a hardwood operation could enjoy increased stability when compared to a softwood operation. Hardwood markets are generally less cyclical than softwoods. This stability could be critical to a small community that has few other employment opportunities.

* Thirdly, the scale of the hardwood industry is similar to the existing Small Business Forestry Enterprise Program (SBFEP). This program has redirected 5% of the softwood resource into the re-manufacturing sector and is a large potential employer. The hardwood resource is nearly 10% of the SBFEP volume, and is certainly of sufficient size to warrant focussed policy initiatives.

If one accepts these three answers, then there are two types of policy initiatives that can help this industry:

* The first type would be classified as "push" initiatives. These would result in an immediate growth of the hardwood industry and are clearly unacceptable given the degree of uncertainty about sustaining the current industry level.

* The second set of initiatives would be labelled as "pull" initiatives. These initiatives would foster a long term growth in the hardwood resource and would facilitate future entrants.

The "pull" initiatives are appropriate for the hardwood industry at this point in time and are detailed below in order of priority. If these initiatives are to be successful, it is important that they are implemented in order of priority. In other words, education without a sufficient inventory would probably not result in much positive growth. Allowing hardwoods as an acceptable species for restocking without an education program would also have little impact.

Conduct hardwood forest inventory

This would be the first step in providing the basis for sustainable development of the industry and is also a precondition for establishing the long term annual allowable cut. Given the statistics shown in Table 6-1, it is obviously not economic to conduct a survey based on the hardwood industry alone. However, as ongoing resource data is collected, and this will probably be driven by the demands of the softwood sector, hardwood data should be included. In this manner the incremental cost would be considerably less.

Once hardwood data is being collected, this would send a signal to industry that the Government is beginning to manage the hardwoods on a sustainable basis. Those managing Tree Farm Licenses should also be encouraged to collect similar data, so that a complete inventory can be achieved.

Education

- Promotional activity is required to overcome the perception of alder as a weed species. There are several examples of yesterday's weed species becoming today's desirable species. For example, ten years ago aspen was viewed as a problem, whereas today the aspen resources support several re-constituted board plants and pulp mills. One of the most successful US alder manufacturers, NorthWest Hardwoods, is owned and controlled by Weyerhaeuser. In fact, Weyerhaeuser have publicly stated that their hardwood operation is the jewel of their Pacific north west operations.

- Disseminate information that shows that the demand for alder is increasing, and that the market not only purchases this species but actually desires it. Many of the traditional hardwood users located in Japan, Europe, and the US are actively looking for alternative supplies of hardwoods as environmental and labour pressures restrict the export of hardwood logs and lumber.

- Research the costs of rehabilitating alder stands to softwoods, and conduct economic assessments to determine the benefits of rehabilitation versus alder plantations. Shifting economics could change decisions that are based on yesterday's perceptions.

- Conduct market research that would investigate opportunities for the falldown products. As was indicated in Section 3, one of the biggest barriers facing the industry is establishing markets for the lower grades of products. A study that would examine this aspect could help all existing hardwood users.

- Conduct research that would investigate the impact of mixing alder chips with the softwood furnish of a coastal pulp mill. If even small percentages, less than 3%, prove economic, this would create a domestic alder chip market.

Classify Alder as an acceptable species for restocking

Existing license holders are forced to eradicate and rehabilitate alder stands in order to increase their annual allowable cut. As Alder is a pioneer species, it may be significantly less expensive to expand the resource base through an alder program than through the current eradication program.

Although existing tree farm license holders may still choose to eradicate existing stands as this allows them to expand their softwood AAC, the option would encourage them to analyze the different options. If changing economics suggest that shorter cycle alder plantations be established, then this policy would be beneficial.

APPENDICES

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E Chip Market Outlook

F Check List for Investors

G Results of BC Hardwood Resource Survey

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N US Pacific Northwest Case Study 2

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APPENDIX A
GLOSSARY

AAC	Annual Allowable Cut
BC	British Columbia
BDU	bone dry unit, 2400 pounds in weight of wood by product, excluding bark, at a moisture content of zero percent
Cintrafor	Centre for International Trade in Forest Products, University of Washington, USA
Chips	pieces of wood (approximately 1 inch square and 1/8 inch thick) resulting from the cutting of pulpwood logs
COFI	Council Of Forest Industries
Crown lands	land owned by the public of British Columbia and managed by the government of British Columbia
Hardwood	broad leaved, deciduous trees that are angiosperms
Hurdle rate	an arbitrary level of performance above which is deemed satisfactory
Kiln dried	wood dried in a kiln with the use of an external heat source
m	metre
m^3	cubic metre
MDF	medium density fibreboard - a dry formed panel product made from sheets from wood flakes combined with synthetic resin and compressed under heat
MMfbm	thousand board feet
MoF	Ministry of Forests
NFPA	National Forest Products Association (US)
OSB	oriented strandboard
Plywood core	centre laminates
Softwood	coniferous trees that are gymnospermae

SSD	Sirategic Services Division of H.A. Simons
US	United States of America
US Pacific Northwest	typically Washington and Oregon but sometimes includes a small portion of northern California

APPENDIX B
EQUIPMENT LISTS

To overview the economics of typical hardwood processing facilities it is necessary to assume some rates of production and probable capital costs. The investor must determine the best compromises between opposing factors such as:

- limited volume of resource vs processing economies of scale;
- softwood machinery availability vs hardwood processing needs;
- higher capital costs for new precise, automated equipment vs more labour intensive older machinery;
- starting up as a primary sawmill only vs primary and reman simultaneously;
- limited capital vs meeting codes, safety, quality, efficiency targets.

These facilities are:

1. A whole log chipper and chip export plant
2. A primary hardwood sawmill, designed to feed the reman plant
3. A reman plant complete with precision kiln, flexible layout and versatile equipment

Assumptions Made

- Throughputs
  - Chip mill - start-up at 200,000 m^3/year (68,000 BDU/year) (BC's eight chip mills range from 14-240 thousand BDU/year)
  - Primary sawmill - 10 Mfbm per 8-hour shift (4-8 million fbm/yr.) (Norvik is 150 Mfbm per 8-hour shift). This mill is designed to operate on a 2-shift per day, 240 days per year basis.
  - Reman plant including kiln - 16 Mfbm per 8-hour shift (3.84 million fbm/yr. input). This assumes that only 8 Mfbm of the 10 Mfbm produced per shift in the primary mill is worthy of further processing. Also the reman plant only operates on a one-shift per day basis for 240 days per year. Falldown in remanufacturing reduces the 3.84 million fbm of input per year to 3.07 million fbm of saleable output.

* Good used machinery prices are in the range of one-half to two-thirds of new prices, which may partially offset the higher maintenance and operating costs of used equipment.

* The kiln is sized for an average 14-day schedule. In practice multiple chambers operating simultaneously yet independently would be employed to kiln dry the (14x16) 24 Mfbm of product.

Chip Mill Equipment

	$ million
* Land 2-5 acres on tidewater with road access for logging trucks and chip vans. Services including power, water, fencing, lighting and fire protection.	1.0
* Chipper building	0.1
* Two trailers for office, crew room, washroom	0.1
* Debarker	0.1
* Chipper foundations/conveyors	0.1
* Chipper, multi-deck screens, Q.C. equipment (installed)	0.4
* Barge loading dock, conveyors and wig-wag (installed)	0.3
* Mill vehicles	0.2
* Maintenance equipment and parts	0.1
Total	$2.4

Notes:

The scale selected for economic analysis is 200,000 m^3/yr. SWE log input, or approximately 75 Kbdu/yr. British Columbia eight chip plants range from 14 to 240 kbdu/yr. averaging 125 kbdu/yr. The facility described is an entry level facility with room to expand.

Primary Sawmill

	$ million
• Land 2-5 acres level drained ballasted road access for logging trucks. Yard roller compacted gravel and blacktop. Services including power, water, fencing, lighting and fire protection.	1.0
• Sawmill building	0.3
• Cut off saw and debarker	0.2
• Sawmill equipment (installed, c/w electrics) including: - stem length deck - band/carriage headrig - 2 saw scragg - bulledger - board edger - trim saw - green chain - conveyors - residues burner	1.2
• Mill vehicles	0.2
• Maintenance equipment and parts	0.1
Sub Total	**$3.0**
• Dry kiln	0.3
• Planer	0.1
Total	**$3.4**

Note:

1. The sawmill proposed receives only sawlog grade logs and, due to relatively small throughput, cannot economically justify facilities for making pulp chips for export to Japan. Residues are typically burned as a method of disposal.

Integrated Chipping/Primary Facility

The capital cost is assumed to be a combination of those shown for the chip mill and the primary sawmill. Savings are attributed to the site it services.

Reman Plant (including dry kiln)

		$ million
*	Land 2 acres with road access for trucks, services including power, water, fencing, lighting and fire protection	1.0
*	Precision dry kiln* multi-chambered 250 Mfbm capacity	0.2
*	Building existing shell and rework (60'x120' @ $28)	0.2
*	Reman equipment, skid mounted, including - infeed deck - band resaw - multi rip saw - hula trim saw - planer - moulder-matcher - jointer - sander - tennoner - dowel borer - shrink wrapper, strapper, stenciller - all conveyors, roll cases, MCCs, dust extraction	1.4
*	Plant vehicles	0.1
*	Maintenance	0.1
Total		**$3.0**

Note: Space must be available to accommodate the next development phase - including equipment such as finger jointing ($200,000), edge gluing ($100,000) and panel sanding ($50,000).

* Note precision dry kiln is included since majority of hardwoods available in BC are in rough-green form. Operating a dry kiln gives remanufacturers control over quality.

APPENDIX C

HARDWOOD STUDY CONTACTS

Contacts	Method of Contact
Hardwood Study Committee Members	PV
Coastland Wood Industries	T,Q,PV
Stork Craft	T,PV
Norvik Timber	T,PV
Primex Forest Products	T,Q,PV
Birchwood Furniture Ltd.	T,PV
Tolko Industries Ltd.	T
Tackama Forest Products Ltd.	T
BWP Millwork Ltd.	T,PV
Bill Smith Forest Products	T
Carlwood Lumber Ltd.	T,Q,PV
Pacific Green Gold Inc.	T,Q,PV
Bill Harvey - birch producer	T
Peter Fisher - consulting economist	T
Discovery Hardwoods Ltd	T,Q
Pacific Pallet Ltd	T,Q
Anonymous potential interior producer	T
Midget Forest Products	T
Kathy Hopkins - Research Branch - MoF	T
Francois Lake Woodworking Ltd	T,Q
Don Ruhl - Export Policy - MoF	T
Scott Paper Ltd.	T
15 Major Forest Product companies	Q
29 MoF Forest Districts	Q

Legend

T - telephone
Q - questionnaire
PV - personal visit

APPENDIX D
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APPENDIX E
CHIP MARKET OUTLOOK

Japan is the world's largest importer of logs and pulpwood/chips. During the decade of the 1980s, these imports have averaged 44 million m^3 per year while the production of industrial roundwood from domestic forests has averaged 32 million m^3. Although the trend in domestic log production has been relatively flat, hardwood supply has been declining while softwood has shown a slight increase. This trend is expected to continue as the majority of Japanese plantations are in softwood species, much of which is older immature. Also significant preservationalist pressures exist for the setting aside of native hardwood forests for aesthetic and recreational enjoyment.

Japanese import data for logs and pulpwood (chips) are shown in Table 1. This table shows that between 1980 and 1989 (both high points in the pulp/paper industry economic cycle) hardwood log imports have declined due to export restrictions in the producing countries of South East Asia while hardwood pulpwood (chip) imports have increased significantly. Virtually all of the pulpwood imports are chips.

Table 1
Japanese Imports of Logs and Pulpwood
(million m^3)

	Logs			Pulpwood		
	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total
1980	17.1	19.2	36.3	9.4	6.1	15.5
81	13.9	15.4	29.3	7.1	5.2	12.6
82	14.2	15.2	29.4	6.2	5.2	11.4
83	14.4	14.3	28.7	5.8	5.4	11.2
84	13.8	13.4	27.2	6.2	6.1	12.3
1985	14.5	13.3	27.8	6.1	5.6	11.7
86	16.0	12.9	28.9	6.3	5.9	12.2
87	17.3	13.9	31.2	6.8	7.0	13.8
88	16.5	13.1	29.6	8.0	8.5	16.5
89	17.4	13.9	31.3	8.6	10.1	18.7

Source: MITI, FAO, JLJ

Over the same period, the virgin fibre mix[1] to the domestic pulp industry has shifted to favour hardwood over softwood. An increasing percentage of the hardwood chips for domestic pulp production has been coming in the form of imports so that in 1989, the supply of imported chips exceeded that from domestic sources.

Table 2
Virgin Fibre for Japanese Pulp Production and Hardwood Chip Supply by Source
(million m^3)

	Pulpwood/Chip Consumption			Hardwood Supply		
	Softwoods	Hardwoods	Total	Domestic*	Import	Total
1980	16.5	16.2	32.7	10.8	6.1	16.9
81	14.6	14.3	28.8	9.1	5.2	14.3
82	14.4	14.7	29.1	9.3	5.2	14.5
83	14.3	15.4	29.7	9.9	5.4	15.3
84	14.7	16.0	30.7	10.2	6.1	16.3
1985	15.0	16.1	31.1	10.5	5.6	16.1
86	15.1	15.9	31.0	9.9	5.9	15.8
87	15.6	16.8	32.4	9.7	7.0	16.7
88	16.9	17.8	34.7	9.6	8.5	18.1
89	17.5	19.3	36.8	9.4	10.1	19.5

* includes chips made from imported logs

Source: MITI, JPA

The Japanese Paper Association (JPA) and the Ministry of International Trade and Industry (MITI) forecast that by the year 2000, Japanese paper and paperboard production will reach 40 million tonnes per year, a 48% increase over 1989. Even assuming some increase in the use of re-cycled papers to 53% of fibre supply, the incremental demand virgin fibre for wood pulp will be in the order of 5 million tonnes.

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[1] The Japanese paper/paperboard industries utilize 50% virgin fibre wood pulp and 50% secondary fibre pulps from waste papers. Of the virgin fibre pulps consumed in 1989, 81% was from domestic pulp mills and 19% was imported. Virgin fibre pulp consumption was 13.5 million tonnes while paper/paperboard production was 26.8 million tonnes.

Based on research conducted by Simons Strategic Services, the apparent policy of most of the Japanese pulp and paper industry will be expand domestic pulp production to the extent that fibre availability will permit. Also, the emphasis will be on chemical pulps, and in particular hardwood BKP. This conclusion is in concert with a recent analysis prepared by the "Paper Business Review" of Japan which forecasts chip imports to be 25.3 million m^3 by 2000 and that 83% of the 1989-2000 increment of 6.6 million m^3 will be hardwood. This forecast is shown in Table 3.

Table 3
Forecast Incremental Demand for Chips by the Japanese Pulp and Paper Industry
(million m^3)

Supply Source	1989 Supply			2000 Forecast			1989-2000 Increment		
	Sw	Hw	Total	Sw	Hw	Total	Sw	Hw	Total
United States									
PNW	4.9	2.1	7.0	5.0	1.8	6.8	+0.1	-0.3	-0.2
South	-	0.7	0.7	0.1	4.0	4.1	+0.1	+3.3	+3.4
Canada	2.1	0.2	2.3	1.9	0.3	2.2	-0.2	+0.1	-0.1
Australia	0.2	4.4	4.6	0.4	4.4	4.8	+0.2	-	+0.2
Chile	0.5	1.1	1.6	0.5	3.0	3.5	-	+1.9	+1.9
Others	0.9	1.5	2.5	1.8	2.1	3.9	+0.9	+0.5	+1.4
Total	**8.6**	**10.1**	**18.7**	**9.7**	**15.6**	**25.3**	**+1.1**	**+5.5**	**+6.6**

Source: MITI, Paper Business Review

While Simons Strategic Services does not necessarily agree with the country specific forecasts of Table 3, a 5.5 million m^3 increase in the hardwood chip import requirement is reasonable. The demand placed on Chile could be considerably higher particularly if, as we suspect, the predicted 3.4 million m^3 hardwood increment allocated to the US South is not forthcoming because of domestic US demand and environmentally motivated restrictions on supply.

Chip Price Outlook

The price history for alder export chips in current and constant 1990 US dollars plus a projection to 1995 are given in Table 4.

Table 4
Export Price for Alder Chips from the Pacific Northwest
($/BDU fob ship)

	Current US Dollars	Constant 1990 US Dollars
1986	91	105
87	95	109
88	107	118
89	121	126
1990	113	113
1991-92 (avg.)		108
1993-94 (avg.)		121
1995+ (avg.)		120

The cost of chip delivery from BC and the US Pacific Northwest to Japan averages about US $40/BDU for both alder and spruce-pine-fir as both contain approximately the same wood volume (i.e. ±2.9 m^3 per BDU). The above mentioned shipping cost excludes any surcharge that may result from the current "oil crisis." As a result, the 1989/90 average cost of alder c&f Japan was about US $117/BDU.

The projections of Table 4 show that the 1990-95 average fob cost of PNW alder should be about 1990 US $115 per BDU and US $155/BDU landed in Japan when it is assumed that shipping costs remain in the order of 1990 US $40/BDU.

APPENDIX F
SAMPLE CHECK LIST FOR POTENTIAL INVESTORS

Note: * indicate "Must" criteria (e.g. mandatory positive responses)

1. Markets

- Are you familiar with market opportunities for BC hardwoods?*

- Have you visited potential buyers and determined specifications, volumes, prices, deliveries, etc.?*

- Have you taken samples of similar product to the intended marketplace?

- Have you selected what product range you plan to market in terms of:*
  a) species or species mix
  b) grade mix
  c) specifications in terms of lengths, sections, etc.
  d) moisture content range and target
  e) surface finish, method and roughness
  f) grain orientation preferences
  g) permissable description for knot size, orientation
  h) permissable defect in terms of rot, stain, colour, borer holes
  i) tolerances on dimensions and permitted distortion
  j) freshness of the machines faces (important in gluing)
  k) colour uniformity/grades

- What are the market demands in terms of:*
  a) terms of payment
  b) order size and lead time
  c) seasonality
  d) currency exchange rate

- What do you propose doing with:*
  a) falldown product (off grade, undersize, etc.)
  b) residues/by-products
     - hog/bark
     - sawdust
     - off cuts/trim
     - log ends (lily pads)
     - defective product
  c) customer rejects

- Have your calculations included possible disposal costs?*

- What are the channels of distribution, established networks, service requirements, packaging requirements?

- Do you know who the potential competitive sources of your proposed product(s) are?*

- What distinct and sustainable competitive advantage do you perceive you have over the competition?*

- How can you protect that competitive advantage once the competition identifies it?*

2. **Resource**

- Have you identified which specie (or species mix) you need?*

- What evidence do you have that sufficient quantities of that specie can be obtained within competitively economic hauling distance of your plant?*

- Who else is also competing for that scarce resource?*

- What data have you obtained in terms of the volume yield and grade yields of the spectrum of grades of logs available?*

- How do you plan to obtain legal access to the log supply* e.g. which type of:
  a) forest licence/tenure
  b) logging road access

- Will you sub-contract the falling, bucking delimbing, yarding, storage and delivery to the mill?

- What are the costs associated with road building, stumpage and delivery of the logs?*

- Have you met with local softwood sawmillers to seek access to their hardwood resources?

- At what stage are your negotiations for:*
  a) access to timber
  b) contracts for falling and hauling

- On what basis will logs be scaled, graded, delivered and paid for?

- Is your source of wood endangered by foreseeable environmental pressures?

- Will logging be seasonal, and how will mill production be affected?

<u>Financial</u>

- Have you prepared a comprehensive business plan?*

- What scrutiny has the financial data in the business plan received?*

- What sources of funds have you explored:* i.e. banks, venture capital lenders, partners, government agencies?

- Which additional sources of funds remain?

- Would you lend your money to such a venture, and what conditions and safeguards would you impose?*

- What safety margins have been allowed for in the financial data?*

Investor Culture

- Have you owned and operated any commercial enterprise before?*
- Are you familiar with wood product processing?*
- Have you visited similar plants to the one you propose?*
- Do you propose "starting small" and growing, or starting "full scale"?
- Have you considered joint venturing with an experienced complementary partner(s)?
- Do you plan to personally operate the plant or hire experienced people?
- What role in the day to day operations do you plan to play?
- What definable and sustainable strengths and abilities do you bring to this venture?

Process/Equipment

- Have you resolved which parts of the following you wish to own and operate: logging, primary sawmilling, dry kiln and remanufacturing? Are you comfortable in negotiating with others for the remainder?

- Do you propose starting up with a "pilot" plant?

- Have you defined how each item in the product range (including falldown) is to be machined, handled, stored and physically distributed?

- Have you an efficient yet flexible plan and equipment layout sketch?

- Have you determined inventory, work-in-process and finished product volumes?

- How is the plant to be scheduled?

- Have you specified the various processes to be undertaken:
  a) on start-up
  b) added in first year of operations
  c) added later

- Have you listed the generic machinery needed?

- Have you identified alternative makers, sizes, options, and new or good-used costs including delivery, freight, taxes, installation and electrical services?

- Has the "best" machinery mix been specified and cost estimated?

- Have costs of spare and consumable parts been included such as cutter sharpening and lubrication?

- Is any of the equipment unique or experimental, and if so, what contingency plans have been made?

- In what ways will the site, the facility layout or the equipment give you a definable sustained competitive edge?

Site Requirements

- Have you selected a processing site?
- What facilities/improvements exist there, and what must be added or deleted?
- Is the site zoned for such usage?
- Can you expect support or opposition from local residents and community?
- Is truck traffic permitted on adjacent streets?
- Is the land incorporated, hence covered by an outside fire department?
- Is it an "efficient" location in terms of transportation?

- Will plant meet existing environmental and zoning regulation with respect to:*
  a) smoke and air particulates from waste disposal
  b) noise from plant and vehicles
  c) dust
  d) truck access
  e) sanitary sewers
  f) chemical storage and usage
  g) fire protection

- Is site serviced by:*
  a) electricity
  b) natural gas
  c) telephone
  d) potable water
  e) sanitary sewer
  f) all weather road

Crewing

- Have you identified the number of employees needed, recruiting method, training and safety needs?

- Have you established equitable rates of pay, benefits, etc. relative to competing employers?

- would the venture accommodate full union labour rates of payment including benefits package etc. or must the economics be predicated on some level of discounting?

- What specific safety hazards have been identified in terms of personal injury?

Insurance

- Under what jurisdiction is the facility covered for fire, ambulance, police, etc.?

- What type of insurance is dictated by the mortgage/chattel mortgage agreements?

- What are the limitations to the insured values; what are those values based upon; is production loss insurance justified?

APPENDIX G
THE HARDWOOD RESOURCE SURVEY

Sixty five (65) hardwood survey questionnaires were mailed out requesting qualitative data and opinions on the hardwood resource throughout BC. Of these, one was sent to each of the 43 Ministry of Forests' Forest Districts within the Province and 22 were sent to representative forest product companies within each of the 6 Forest Regions.

Forty four (44), or 68%, of the questionnaires were returned, and a good distribution among Forest Regions was obtained. A summary of the results by Forest Region is presented below.

Questionnaires are summarized on a Provincial basis, as follows:

. **Inventory Data**

With respect to the location and volume of hardwoods, inventory data is considered adequate in the Cariboo, Nelson and Prince Rupert Forest Regions but inadequate in the Kamloops, Prince George and Vancouver Regions. Data on log/tree quality and size was considered inadequate in all Regions.

. **Major Species**

Aspen is the major hardwood species in the Cariboo, Kamloops, Prince George and Prince Rupert (Interior) Regions.

Cottonwood is the major species in the Nelson and Prince Rupert (Coast) Regions.

Alder is the major species in the Vancouver Region.

. **Volumes and Concentrations**

In the Kamloops and Nelson Regions, hardwood volumes are not considered significant, and are relatively scattered with few concentrations.

In the Cariboo Region, although some significant concentrations exist, most of the hardwood is scattered throughout the Region.

In the Prince George Region, significant volumes of hardwoods occur in most areas, both in pure concentrations and in scattered pure and mixedwood stands throughout the Region.

In the Prince Rupert Region, significant hardwood volumes occur in most areas with a tendency to be concentrated in the valley bottoms.

In the Vancouver Region, hardwood volumes are not considered significant within TSA's and most TFL's. Extensive, concentrated hardwood stands occur primarily within TFL's located in the Powell River/Stillwater and Johnstone Strait areas.

. **Hardwood Use and Mills**

Currently, only minor volumes of hardwood are being harvested and utilized within the Cariboo, Kamloops, Nelson and Prince Rupert Regions.

In the Prince George Region, significant hardwood volumes are being harvested and utilized in the Fort Nelson and Dawson Creek areas for the production of plywood, waferboard and chopsticks.

In the Vancouver Region, significant hardwood volumes are also being harvested and utilized for the production of pulp, pulp chips and lumber.

APPENDIX H

THE HARDWOOD RESOURCE: OVERVIEW

The six major hardwood species in BC, in decreasing order of magnitude, are as follows:

- Trembling aspen (Populus tremuloides Michx.)
- Cottonwood - Black cottonwood (Populus trichocarpa Torr.)
  - Balsam poplar (Populus balsamifera L.)
- White birch (Betula papyrifera Marsh.)
- Red alder (Alnus rubra Bong.)
- Broadleaf maple (Acer macrophyllum Pursh.)

In 1989, the gross volume of mature timber in British Columbia was almost 8,600 million cubic metres (m^3), of which 325 million m^3, or 4%, was hardwoods.

Table 1 indicates the broad distribution of the 1989 mature hardwood inventory volume by species and between the BC Coast and Interior.

TABLE 1
1989 DISTRIBUTION OF MATURE HARDWOOD VOLUME
(million's m^3)

Species	Coast	Interior	Total	%
Aspen	1	227	228	70
Cottonwood **	4	49	53	16
Birch	*	33	33	10
Alder	9	*	9	3
Maple	2	0	2	1
Total	**16**	**309**	**325**	**100**

Source: MOF/COFI. Rounding by Consultant.
* Less than 0.5 million m^3.
** Includes black cottonwood and balsam poplar.

A comprehensive breakdown of hardwood volumes showing their distribution by species, forest region, tenure and ownership based on current data is not available. However, such a breakdown was prepared by the Ministry of Forests (MOF) in 1976, based on 1974 data. Although this data is most probably out-of-date, and was based on Imperial Units and the old Public Sustained Yield Units rather than on Metric Units and the new, larger Timber Supply Areas, it still provides a very useful indication of the relative hardwood distribution by species, forest region, tenure and ownership within British Columbia.

Table 2 summarizes 1974 MOF mature hardwood inventory data by species, forest region, and tenure/ownership in metric units.

TABLE 2

1974 DISTRIBUTION OF MATURE HARDWOOD VOLUME

Forest Region/ Ownership/Tenure	Mature Volume by Species - 18 cm Dbh plus (000's m^3)					
	Cottonwood	Alder	Maple	Birch	Aspen	Total
Cariboo Region:						
Crown - TSA	1,394	0	0	1,623	4,276	7,293
Crown - TFL	0	0	0	0	440	440
Crown - Temp.	21	1	0	2	4	28
Private,incl.TFL	98	*	0	145	463	706
Parks,Reserves	175	8	0	115	280	578
Federal lands	2	0	0	7	63	72
Subtotal	1,690	9	0	1,892	5,526	9,117
Kamloops Region:						
Crown - TSA	281	0	0	588	853	1,722
Crown - TFL	3	0	0	66	39	108
Crown - Temp.	36	0	0	26	8	70
Private,incl.TFL	294	0	0	108	156	558
Parks,Reserves	202	6	0	308	155	671
Federal lands	73	0	0	12	44	129
Subtotal	889	6	0	1,108	1,255	3,258
Nelson Region:						
Crown - TSA	566	0	0	174	136	876
Crown - TFL	22	0	0	12	5	39
Crown - Temp.	67	0	0	4	12	83
Private,incl.TFL	333	0	0	60	63	456
Parks,Reserves	11	0	0	3	1	15
Federal lands	6	0	0	2	3	11
Subtotal	1,005	0	0	255	220	1,480
Prince George Region:						
Crown - TSA	28,507	0	0	12,467	83,086	124,060
Crown - TFL	198	0	0	409	226	833
Crown - Temp.	77	0	0	38	50	165
Private,incl.TFL	1,195	0	0	481	6,106	7,782
Parks,Reserves	55	0	0	79	314	448
Federal lands	188	0	0	41	483	712
Subtotal	30,220	0	0	13,515	90,265	134,000

TABLE 2 (Cont'd)

Forest Region/ Ownership/Tenure	Mature Volume by Species - 18 cm Dbh plus (000's m^3)					Total
	Cottonwood	Alder	Maple	Birch	Aspen	
Prince Rupert (Coast) Region:						
Crown - TSA	1,633	2,198	0	111	45	3,987
Crown - TFL	2,665	360	0	117	311	3,453
Crown - Temp.	186	118	0	5	0	309
Private,incl.TFL	423	64	0	5	3	495
Parks,Reserves	31	14	0	*	1	46
Federal lands	508	46	0	5	15	574
Subtotal	5,446	2,800	0	243	375	8,864
Prince Rupert (Interior) Region:						
Crown - TSA	13,574	109	0	2,315	16,759	32,757
Crown - TFL	1,300	32	0	129	363	1,824
Crown - Temp.	528	56	0	1	*	585
Private,incl.TFL	666	19	0	84	777	1,546
Parks,Reserves	211	6	0	269	527	1,013
Federal lands	141	4	0	18	134	297
Subtotal	16,420	226	0	2,816	18,560	38,022
Vancouver Region:						
Crown - TSA	1,034	783	240	133	43	2,233
Crown - TFL	43	5,486	160	1	0	5,690
Crown - Temp.	153	140	68	20	0	381
Private,incl.TFL	214	3,730	444	75	0	4,463
Parks,Reserves	7	102	41	20	0	170
Federal lands	54	64	49	5	0	172
Subtotal	1,505	10,305	1,002	254	43	13,109
TOTAL PROVINCE:						
Crown - TSA	46,989	3,090	240	17,411	105,198	172,928
Crown - TFL	4,231	5,878	160	734	1,384	12,387
Crown - Temp.	1,068	315	68	96	74	1,621
Private,incl.TFL	3,223	3,813	444	958	7,568	16,006
Parks,Reserves	692	136	41	794	1,278	2,941
Federal lands	972	114	49	90	742	1,967
TOTAL	**57,175**	**13,346**	**1,002**	**20,083**	**116,244**	**207,850**

* Less than 0.5 million m^3.

From Tables 1 and 2, a number of conclusions regarding hardwood distribution in British Columbia can be drawn, as follows:

- broadleaf maple is found only in the Vancouver Forest Region. It is fairly equally distributed between Crown and private lands.
- cottonwood is found in all Forest Regions. However, it is concentrated primarily in the Prince George and Prince Rupert Forest Regions, mainly on Crown lands.
- birch is also found in all Forest Regions. However, it is primarily concentrated in the Prince George Forest Region, mainly on Crown lands.
- aspen is also found in all Forest Regions. The major concentrations are found in the Prince George Forest Region, with secondary concentrations in the Prince Rupert (Interior) Region, primarily on Crown lands.
- alder is found primarily in the Vancouver Forest Region. However, significant volumes are also present in the Prince Rupert Forest Region. In the Prince Rupert Region, most of the alder is located on Crown lands within Timber Supply Areas. In the Vancouver Region, however, most of the alder is located on Crown lands within Tree Farm Licenses and on private lands both within and outside of TFL's.

The terms of reference for this study requested that the major effort be placed on red alder and birch. Additional data on these two species is presented in the following sections.

APPENDIX I
THE ALDER RESOURCE

FRDA Report 115, 'Current Biomass Status of Red Alder in Coastal British Columbia', by M.R.C. Massie, provides the most recent available documentation regarding the area and merchantable volume of alder in 1984. Tables 4 and 5 summarize this data.

TABLE 4

1984 MERCHANTABLE VOLUME OF ALDER
(000's m^3)

Supply Area	Mature Stands* Pure	Mature Stands* Mixed	Mature Stands* Total	Immature Stands**	Total Alder
North & Mid-Coast	377	2 374	2 751	770	3 521
South Coast	826	2 262	3 088	7 625	10 713
Total	**1 203**	**4 636**	**5 839**	**8 395**	**14 234**

* 80 years and older. ** Less than 80 years in pure stands only.

TABLE 5

1984 AREA IN PURE ALDER STANDS*
(ha)

Supply Area	Mature	Immature	Total
North & Mid-Coast	2 225	7 510	9 735
South Coast	2 970	44 311	47 281
Total	**5 195**	**51 821**	**57 016**

* Stands in which alder is the leading species.

In the North and Mid-Coast supply area, the majority of the alder volume and area is located on Crown lands. In the South Coast supply area, both the mature and immature alder volume and area is equally divided between Crown lands and private/other lands.

Table 1 indicates a 'mature' alder volume of 9 million m^3 in 1989. Table 2 indicates a 'mature' alder volume of close to 13 million m^3 in 1974, based on all volume over 18 cm dbh. Table 4 indicates a 'merchantable' alder volume of close to 14 million m^3 in 1984, including both mature and immature stands. Differences are most probably related to differing bases on which the data were put together by the various authors.

Table 5 indicates that the total area in pure mature and immature alder stands on the Coast is close to 57 000 hectares.

The Consultant therefore concludes that there is in the order of 12 million m^3 of mature alder on the BC Coast. If 25 to 50% of this were to be withdrawn or constrained because of 'other resource requirements' such as fish, wildlife and aesthetics, the annual cut available over the next 20 years would range between 300 000 to 450 000 m^3.

Furthermore, if 50 to 75% of the 57 000 hectares now growing mature or immature alder remained available for the growing and harvesting of alder, and achieved a mean annual increment in the order of 10 m^3 per hectare per year, the annual cut of alder should be able to be sustained at between 300 000 to 450 000 m^3 per year.

APPENDIX J
THE BIRCH RESOURCE

Table 3 summarizes the 1974 data contained in Table 2, plus September, 1990 volume and immature area data provided by the MOF for Crown lands within Timber Supply Areas.

TABLE 3
VOLUME AND DISTRIBUTION OF BIRCH

Region	1974 * Mature Volume (000's m^3)	1989 ** Mature Volume (000's m^3)	1989 ** Immature Area (ha)
Cariboo	1 892	1 641	9 164
Kamloops	1 108	2 603	17 786
Nelson	255	277	6 986
Prince George	13 515	18 751	85 853
Prince Rupert	3 059	2 272	6 367
Vancouver	254	198	6 675
TOTAL	20 083	25 742	132 831

* All ownerships ** Crown portion of TSA's only.

Table 3 indicates that there is considerably more mature birch volume in 1989 than there was in 1974, particularly in the Prince George Region. In addition, there are significant areas of immature birch in the Prince George Region. The specific location and concentration of these mature volumes and immature areas is unknown, as is the degree to which these volumes and areas may be 'netted down' owing to environmental constraints.

If 50% of the 'mature' birch volume in the Prince George Region were available for harvesting, after 'netting down' for other resource values/constraints, the annual cut of birch over the next 20 to 30 years could be in the order of 300 000 to 500 000 m^3. Following this, the sustainable annual harvest of birch would be in the order of 250 000 m^3, assuming 50% of the total birch area would be available and a mean annual increment in the order of 3 m^3 per hectare per year.

APPENDIX K

CREWING

		Per Shift	Per Day
1.	**Chip Mill**		
	Manager	1	1
	Front End Loader Operator	1	2
	Slasher/Debarker Operator	1	2
	Chipper/Screen Operator	1	2
	Reclaim Front End Bucket Operator	1	2
	Maintenance Men	1	2
	Sub-Total	6	11
2.	**Primary Sawmill** (2 shifts/day)		
	Manager (also manages reman plant)	1/2	1/2
	Supervisor/Foreman	1	2
	Front End Loader Operator	1	2
	Cut-off Savy Debarker Operator	1	2
	Headrig Sawyer	1	2
	Bull Edger Man	1	2
	Board Edger Man	1	2
	Trimmer Man	1	2
	Green Chain/Sorter/Stickerman	2-1/2	5
	Fork Lift Operator	1/2	1
	Maintenance/Sharpening Men	1	2
	Sub-Total	11-1/2	22-1/2
3.	**Reman Plant (1 shift/day) and Kiln (3 shifts/day)**		
	Manager (also manages primary mill)	1/2	-
	Supervisor/Foreman	1	-
	Kiln Man	1/4	-
	Fork Lift Man	3/4	-
	Planer/Moulder Operator	1	-
	Trimmer Operator	1	-
	Four Sorter/Stacker Men	4	-
	One Shrink Wrap, Package, Shipper	1	-
	Sub-Total	9-1/2	-

APPENDIX L

HARDWOOD
REMANUFACTURING OPPORTUNITIES

Product

Beds or bunks
Benches
Bins
Boxes
Brooms
Brushes
Cabinets & custom millwork
Cabinets & Cabinet work
- Bathroom & kitchens
- Filing and office
- Medicine
- Radio, Phonograph.etc

Chopsticks
Containers
Crates
Desks
Displays
Doors
Fences
Flooring
Frames, Picture and mirror
Furniture
- Frames
- Custom built appearance
- Garden, lawn, porch & camping
- Unfinished
- Parts

Handles, tool
Hangers, clothes
Marker, survey
Mouldings
Novelties
Pallets and skids
Panelling
Racks - display, spice, etc
Railings
Sash, door & window
Shelving
Spindles
Stairs
Tables
Toys

APPENDIX M
CASE STUDY 1 - PACIFIC NORTHWEST HARDWOOD SAWMILL

Primary Hardwood Producer Perspective

The hardwood sawmill contacted was Ross-Simmons Hardwood Lumber, Inc. in Longview, Washington. This firm was established in 1960 and has an annual capacity of 40 million board feet of alder per year and employs 120 personnel on a two-shift basis.

1. Fibre Supply

Timber Supply (Primary Concern)

The resource is out there but harvest of hardwoods is strongly linked to logging for pulp and paper and the conifer industry, hence hardwood log supply is dependent on the economies of those industries. This is compounded and aided by the lack of serious hardwood harvest programs by public agencies. Foresters still have a negative attitude about hardwoods and the tendency is to design sales in such a way that hardwoods are always a part of a sale designed for other industry sectors.

Alder logs are difficult to tow in water due to a tendency to sink. Mixing alder with other more buoyant species often proves too inconvenient. Unacceptable staining can occur to alder logs when stored in water.

Timber Quality (Minor Concern)

Hardwood log quality is not the same as in conifers. It is mainly a function of diameter since alder is a good early self pruner. Most mills have adopted technology to utilize logs down to a 6" diameter and are able to get good recovery.

Timber Cost (Primary Concern)

There has been an abundance of primary product produced as mills have adopted newer, more efficient technology and expanded capacity. Competition for logs has increased to the point that delivered log costs are at an all time high. This places mills in the position of declining revenues without being able to influence either lumber prices or log costs.

2. Markets

Market Size (Primary Concern)

Mill capacity has increased and all mills can produce more than present output. There is a need to expand and diversify markets, especially for the lower lumber grades which account for more than half of the output. Historically, these grades went to Southern California for frames of upholstered furniture. More recently pallet manufacture has provided an outlet for some of this lower grade material. Despite surplus supplies of low grade hardwoods, the pallet and coating sector is so price sensitive it is unwilling to pay the asking price, compounding the surplus and the unsatisfactory returns. However, it is believed that this market must be expanded and diversified through additional education and promotion.

Markets for higher grades are widespread and diverse due to vigorous promotional efforts. Exports began about 1980, developing first in Japan for the highest grades and then in Korea and Taiwan for somewhat lower grades. Shipments to Europe have shown signs of rapid growth as European firms look for alternatives to tropical hardwoods. Substitution of tropical hardwoods by BC's unutilized and potentially renewable hardwoods is seen to be the basis of considerable market promotion opportunity. Further, the whiteness of alder or birch can either:

- address demand for the "Scandinavian look" currently the domain of coniferous species or
- be colourized by staining to simulate a wide range of species.

Market Growth (Primary Concern)

European demand is growing rapidly. More educational and promotional effort is needed in old and potential markets.

Barriers to Trade (Secondary Concern)

Obviously lowering of tariffs would help but products are moving well in spite of them.

Byproduct Markets (Secondary Concern)

This depend on the location of a particular mill with respect to possible by-product outlets. Generally, disposal of clean chips is not a problem as there are good domestic and export markets for chips. Hog fuel and sawdust can be a problem; many burn these residues to generate dry kiln energy but some have an excess. Other outlets include animal bedding and mulch, but a better job of education and marketing of these residues is needed. The biggest problem seems to be log yard waste; wood chunks, bark and dirt. These have typically been disposed in landfills but this is becoming a less viable option and some solution must be found.

3. Process

Product Quality (Minor Concern)

Hardwood lumber produced in the Pacific Northwest has always been sold surfaced dry and graded with standard or proprietary grades. This additional manufacture, compared to the common practice of marketing rough green or rough dry lumber in other regions, has been a positive marketing tool. When alder's excellent machining, stability and finishing properties and versatility to be used with a natural finish or stained to imitate other species are considered, there are few product quality problems. However, this is not to say that problems will not occur if well known, available processing methods are not used.

Drying is another critical area. Hardwoods take longer and are more difficult to dry compared to softwoods and care is needed with alder to avoid drying defects and to control colour. Drying schedules are well known within the industry.

Two final areas of concern are that hardwoods are still viewed by some as worthless weeds, and uses and versatility of alder are not widely understood by potential customers.

Technology Availability (Secondary Concern)

There are no real problems as there is plenty of good equipment available to meet industry needs. A number of firms are adopting machinery that allows quick and flexible changes between English and metric product sizes. A major concern can be the cost of new machinery and the availability of financing.

Cost (Secondary Concern)

Everyone wants to see costs decrease. The major cost item is delivered log cost, something a mill has little control over.

Start-up (Secondary Concern)

Sawmills and veneer mills in the hardwood industry are relatively small investments and less difficult than softwood counterparts or pulp mills.

4. Economic

Financial Resource Availability (Primary Concern)

Most mills are small independents and have difficulty raising capital needed to fund expansion, new machinery or innovations. Those which are a subsidiary of a larger firm often have access to more resources and consequently tend to modernize sooner and innovate more.

As a result of increased capacity that seems to have grown faster than markets (see section on market lumber prices have not grown rapidly.

5. Corporate Culture (Primary Concern)

The hardwood industry is mainly composed of small independent firms, many of which have a conservative attitude toward change. Most consider this to be a specialty business that must pay close attention to customers.

Those who are accustomed to high-volume softwood commodity markets and processes will have to make major adjustments in order to succeed with hardwoods.

APPENDIX N

CASE STUDY 2 - PACIFIC NORTHWEST HARDWOOD SECONDARY MANUFACTURER

Secondary Hardwood Producer Perspective

The secondary manufacturer interviewed is HMC Industries in Lynnwood, Washington. This firm, established in 1946, has two primary businesses; manufacture of commercial display cabinets and fixtures and manufacture of turned products from red alder. It uses between 60 and 70,000 board feet of alder per month in the turning business and about half of its labour force of 30 is engaged in this activity.

Each issue subsection is divided into two parts. The first is based on an interview with a secondary producer of alder turned parts that are distributed nationwide. The second part of each section is based on a survey of Washington state secondary manufacturers (Dirks 1990).

In general, secondary wood products firms in Washington are small (75% with less than 25 employees and 85% with annual sales less than $5 million) and there were few significant differences in responses due to firm size or hardwood vs softwood emphasis. When significant differences did occur, they were mainly between different industry categories (i.e. furniture, cabinets, millwork, wood preservers, etc.). The general perception of these industries as a whole is presented as representing a good cross sectional average of how the whole secondary industry perceives these issues.

1. Fibre Supply

Lumber Input Supply (Secondary Concern)

- Interview - Availability of alder (#2 & #3 lumber grades) is not a problem. It is plentiful and prices have been stable. A concern was expressed regarding the long term supply of hardwood timber in the region due to the combination of environmental actions and attitudes of land managing agencies toward hardwoods.

- Secondary Survey - In general this was a secondary concern, except when tied to specific high quality grades. In fact, firms using hardwoods felt that supply was less of a concern than firms using softwoods.

Lumber Input Quality (Secondary Concern)

- Interview - There are no problems with alder. However, supplier mills do vary, especially in the degree to which a shipment of a given grade is considered to be above, below or on the expected norm for the grade. Some mills attempt to place marginal pieces in the higher grade while others put them in the lower grade. Others make special pulls from a grade and what is left can deviate from the norm.

- Secondary Survey - Responses suggest the same attitude as the interview.

Costs (Primary)

- Interview - While the cost of wood is important, it is not subject to control by a small mill. A more critical factor is to have price stability. Firms often enter contracts with buyers that may last for up to a year. This is because buyers wish to lock in a cost so they can print catalogs and advertise prices. Unstable raw material prices add considerable risk and uncertainty to this process.

Of more concern and control to a specific firm are its labour costs and its decisions concerning costly equipment purchases.

- Secondary Survey - Costs of raw material and labour vary from 34-55% and 21-36% of operating costs depending on the type of the industry. Cost control is an issue and these were two of the top four concerns cited by secondary processors. It should be noted that only 7% of the responding firms employed unionized labour. Raw materials cost concerns are likely to be more acute in firms/industries that require higher grade feedstocks.

2. Markets

Market Size (Minor Concern)

- Interview - From the perspective of a small firm overall market size is adequate. However, the market can be differentiated into different levels of relationships with buyers. On one extreme are large national firms such as Sears whose demand for a single item can outstrip the capacity of most manufacturers. While supplying such a buyer can guarantee steady business, negotiations to capture a piece of this action can lead to low margins. Also, since there is little buyer loyalty, there is the risk that a firm that takes on such a contract may find itself without this business next year. At the other extreme are small buyers who make orders that are more variable with respect to size and timing. These can cause scheduling problems with periods of over and slack time. In all cases there is little buyer loyalty; firms continually shop for the least cost producer, hence margins are low.

- Secondary Survey - Less than 10% of the firms responding to the survey felt that lack of customers was a serious problem.

Market Growth (Primary Concern)

- Interview - Demand for temperate hardwoods should grow. There is a need to develop more alternative markets for the middle and lower grades.

- Secondary Survey - 87% of respondents believe that there is an opportunity to expand into new markets.

It would appear that market growth opportunities are abundant, but firms may not be well positioned to take advantaged of it due to small size, limited marketing/ promotional capabilities and problems in expanding plant capacity.

Barriers to Trade (Primary Concern)

- Interview - Except for occasional shipments to Canada, no exporting is done. This is mainly due to small size and focus on domestic markets.

- Secondary Survey - Only 9% of respondents indicated that they export. Japan and Canada were the two countries most frequently cited. Trade barrier issues were not specifically addressed.

This item is given a minor rating since so few have been involved in foreign markets. This would probably be a primary concern if more exporting was being attempted.

Byproducts Market (Minor Concern)

- Interview - Disposal of wood by-products is not a problem. Farmers prefer alder shavings/sawdust as an animal bedding, and there is a ready firewood market for solid scraps.

- Secondary survey - This issue was not addressed directly in the survey and, in an open-ended question to list additional concerns, by-product disposal was mentioned infrequently. As in the primary industry, this may be a location issue.

3. **Process**

Product Quality (Minor Concern)

- Interview - No problems.
- Secondary Survey - Issue not addressed.

Technology Availability (Minor Concern)

- Interview - Wood costs are high but cannot control this so the key issues are the cost of labour and cost and justification of new machinery.

- Secondary Survey - Out of a list of possible concerns, raw material supply/cost and cost of labour were two of the four most frequently mentioned items. The other two were taxes and cost of capital.

Start-up

This is probably less a factor than most primary solid wood industries.

4. Economic

Financial Resource Availability (Primary Concern)

- Interview - Recent purchases have been internally financed but new equipment is very expensive and must be carefully rationalized.

- Secondary Survey - Availability and cost of capital was one of the four most frequently cited concerns checked by respondents. In another part of the survey about 2/3 said that availability and cost of capital was limiting equipment purchase plans.

5. Corporate Culture (Primary Concern)

Like the primary industry, secondary industry is dominated by small, independent, conservative firms that have historically focussed on local and regional domestic markets. These are typically specialty markets where close attention to customer need is required, but some products should be viewed more like low margin commodities where the small producer is at the mercy of larger buyers who can shop among many possible suppliers. A good example would be turned products.

These firms have little exporting expertise and tend to use relatively primitive promotion methods. For example, the survey found that the three most frequently checked means of promotion were relying on word-of-mouth, product brochures, and business cards. These methods were checked by at least half of the respondents. In contrast, not more than one in five firms checked use of direct mail, media advertising, or trade journals as promotional activities.

APPENDIX O

PACIFIC NORTHWEST
HARDWOOD FOREST INVENTORY CONCERNS

Inadequate Inventory Data

Forest inventories in the Pacific Northwest are conducted and published by the US Forest Service. The system of plots for this purpose is relatively sparse as the main purpose of these inventories has been to characterize the resource at a fairly broad level. Statistically speaking, the inventory is not of much value by firms making plans with respect to mill sitting or expansion. In addition, past standards for measuring and characterizing hardwoods have not been as rigorous as for conifers. This is especially true in characterizing young hardwoods that will be the future of the industry. There is concern that young hardwoods are often not counted, or are considered as "brush" giving the impression that young stands for the future do not exist. When these features are combined with the infrequency of field re-measurements (every 10 or more years as best) and additional lags in analysis and publication, the officially published statistics concerning the resource are out of date as well as being of limited usefulness in defining the hardwood resource. This is important considering the changing activities on industry and small private owner lands, categories which control between 70% and 80% of hardwoods. These official data create an atmosphere of uncertainty with regard to how much resource exists and how it is structured and controlled.

Availability

A second aspect of supply is concerned with how much of the inventory is potentially or actually usable, as a basis for industrial activity. How much of the resource lies within special management areas such as streamside buffers, riparian zones and wetlands, spotted owl conservation areas, etc.? At present, it is not clear how much of the hardwood resource lies within such special management areas, what management and harvesting will be allowed, and if these restrictions will make extraction uneconomical. Policies of agencies responsible for managing these areas are evolving and the implications to hardwood processors are not clear.

Another aspect of availability relates to seasonal and business cycles that influence logging operations. Harvest of hardwoods is strongly linked to the health of the softwood industry for two reasons. First, most sales created by agencies are primarily designed with an eye toward the softwood industry. Although hardwoods may be present in significant quantities, hardwood mills may not have the size and resources to bid on them. Complaints by hardwood firms concerning public agency timber sale procedures are numerous and, while some progress has been made, hardwood firms feel that there is still a conifer bias. Second, since most logging operations are in sales designed for conifers, hardwood availability has a seasonality associated with the summer move into higher elevations and winter move to lowlands where hardwoods are more plentiful. In addition, when the general economy and housing markets soften, logging for softwoods is often curtailed with a commensurate reduction in hardwood harvest. Hardwood mills, which usually experience less impact in their markets, often face serious log shortages.

Competition

Historically, hardwood use was mainly by sawmills who processed sawlogs into furniture lumber for domestic and export sales. They also produced pallet lumber and sold chip residues to pulp mills. During the 1980s, this situation changed. The pulp and paper industry has greatly increased its demand for hardwood furnish and directly competes with sawmills for roundwood. A number of independent chipping firms now purchase hardwood tracts and sell chips on the domestic and export markets. Spot prices around the region show rapid increases in the prices of sawlogs, pulp logs and chips. In addition, an export market has developed and grown for the largest hardwood sawlogs. This competition with pulp mills and log exports has put a serious strain on sawmills by escalating their log costs and removing the best (export) logs. In the long run this competition may be good for the mills by forcing them to become more efficient. It is also good for the landowner who is enjoying better prices for hardwoods and hence an incentive to grow them.

APPENDIX P
ECONOMICS

This appendix presents an overview analysis of potential investments that could be suitable to process BC hardwoods. Five case studies are analyzed:

- Hardwood chipping facility
- Integrated chip/primary facility
- Lumber facility
- Remanufacturing facility
- Integrated primary/remanufacturing facility

Log exports are not analyzed. While the markets exist, the perceived loss of potential jobs and value-added makes this an unacceptable option.

A "base case", after tax, return on capital (ROC) is calculated for each option. Sensitivity analysis tests the various assumptions used in each case study. Both the upside opportunities and the downside risks are explored. It must be emphasized that these analyses assume that the investor has incorporated the critical success factors in his business plan. For example, the scenarios assume a certain size/scale of plant which is relatively large and may not be feasible as there may not be adequate timber resources to sustain these plants in a specific region.

Case 1: Chipping Facility

Base Case

The cost characteristics of a BC chipping facility are based on a mill chipping alder at a competitive scale of about 200,000 m^3/year. The capital cost of such a facility is approximately $2.4 million. Delivered export alder chip prices in BC have ranged between about $39 and $48/$m^3$ over the last two years. Delivered prices are currently averaging about $45/$m^3$ output. The economics of this facility are shown in Table 1.

Table 1
BC Alder Chipping Facility
Economic Attributes

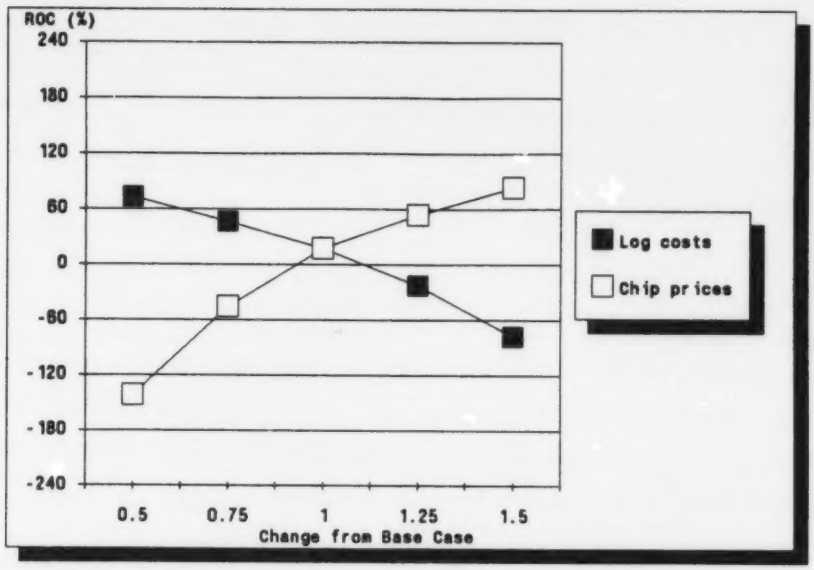
Scale of output	196,000 m^3/year	
Input requirements	200,000 m^3/year	
Capital costs	$2.4 million	
Working capital	$0.8 million	
	$ Million	**$/$m^3$ input**
Revenues		
Chips	8.82	44.1
Cash Costs		
Logs	6.40	32.0
Labour	0.42	2.1
Materials/Supplies	0.70	3.5
Admin., Sales & Fixed	0.40	2.0
Total	7.92	39.6
Cash Flow Before Taxes	0.90	4.5
Cash Flow After Taxes	0.56	2.8
Return on Capital (before tax)	28.1%	
Return on Capital (after tax)	17.5%	

Assumptions:
- labour 11 persons @ $15/hour plus 30% benefits
- 2-shift operation, 240 day basis
- 100% equity
- return on capital is calculated on capital costs plus working capital
- capital costs include land cost

Sensitivity Analysis

The sensitivity of return on capital before taxes (ROC) to changes in log costs, and chip prices are shown in Figure 1. These components are varied independently by ±25% and ±50% while holding the other variables constant.

Figure 1
BC Hardwood Chipping Facility
Sensitivity of Return on Capital



Return on investment of a chipping venture is most sensitive to changes in log costs and prices. Chip prices were varied over a range of $\$23/m^3$ to $\$68/m^3$ output. Although this wide range of prices has not been experienced, see Appendix E for a discussion of chip markets, a small drop in prices makes this an unattractive investment.

A substantial change in log costs is more probable, especially alder, because supply is restricted. Alder roundwood prices are very sensitive to slight increases in demand. When new players enter the market supply tightens, driving prices up (i.e. the supply curve is relatively inelastic).

If higher alder roundwood prices are sustained for any period of time, the supply of alder could increase, unless the supply of alder is already at its limits. In this case the price increase would be sustained for all hardwood users.

In the sensitivity analysis, the range of log costs examined were $\$17/m^3$ to $\$50/m^3$. The high end is certainly not unrealistic and, in specific circumstances, is being experienced now. The lower end will be governed by the average variable delivered wood costs of the lowest cost producers, a floor which is likely to be greater than $\$17/m^3$. Figure 1 illustrates that if log costs are closer to $\$40/m^3$ or $\$50/m^3$, the economics of the chipping venture become very unattractive.

Case 2: Primary Facility

Base Case

This option assumes a hardwood only lumber facility and not on an integrated softwood/hardwood facility. Most successful hardwood primary facilities are designed to produce value not volume and there are few, if any, examples of combined softwood/hardwood mills that have achieved consistent success.

The "base case" represents a mill designed to produce varying grades of lumber but because of the log input quality, currently produces around 50% pallet stock and 50% shop and better grades. All lumber is kiln dried. The economics of this operation are presented in Table 2 below.

Table 2
BC Alder Primary Facility
Economic Attributes

Scale of output	5,300 Mfbm/year
Input requirements	25,000 m^3/year
Capital costs	$3.4 million
Working capital	$0.2 million

	$ Million	$/Mfbm
Revenues		
Lumber	2.28	430.0
Chips	0.39	74.0
Total	2.67	504.0
Cash Costs		
Logs	0.88	166.0
Labour	1.05	198.0
Materials/Supplies	0.40	76.0
Admin., Sales & Fixed	0.30	57.0
Total	2.63	496.7
Cash Flow Before Taxes	0.04	7.0
Cash Flow After Taxes	0.03	4.3
Return on Capital (before tax)	1.1%	
Return on Capital (after tax)	0.8%	

Assumptions:
- Lumber recovery factor - 50% green
- Chip recovery factor - 35%
- Manpower - 28 persons @ $15/hr. plus 30% benefits.
- 2 shifts, 240 day basis
- return on capital is calculated on capital costs plus working capital

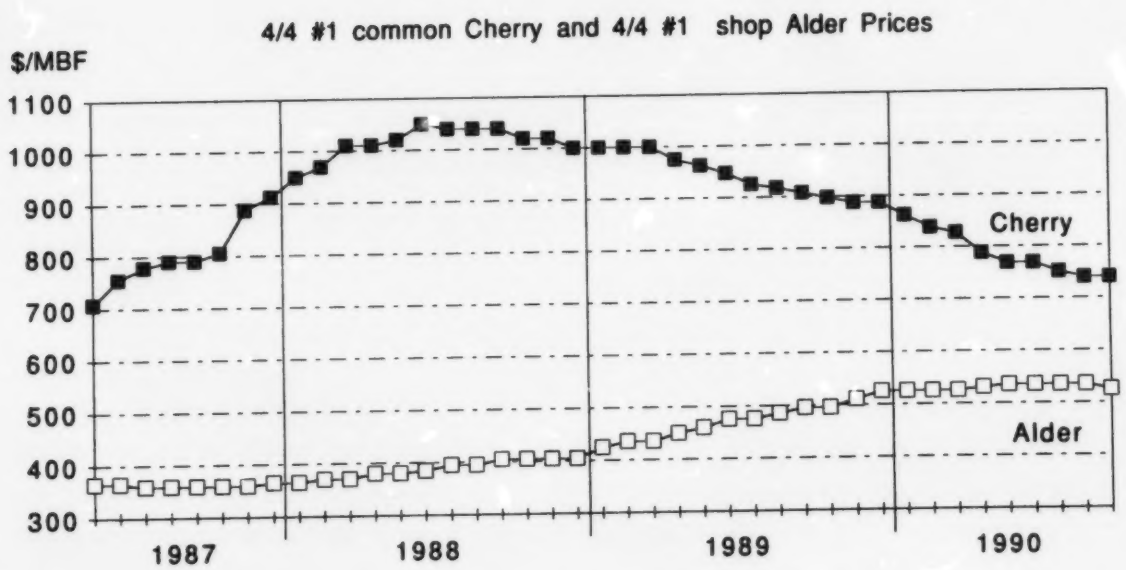
Sensitivity Analysis

To simulate a change in product mix, product prices are examined over the range of $215/Mfbm and $645/Mfbm. The high product prices assumes that an adequate resource, both log quality and size, exist to support the higher grade product out turn. An average price greater than $600/Mfbm could only be realized under ideal conditions.

With the allowable harvests in BC of traditional hardwood species (e.g. oak, maples, etc.) declining and with the supply of tropical hardwoods originating out of SE Asia becoming tighter, increasing attention is being directed at the North America species such as alder. As alder is priced lower (see Figure 2) and can be stained to represent cherry, amongst other species, it is being substituted for these species in Europe and the US. These two trends, diminished traditional resources and versatility of alder, is increasing demand for the upper lumber grades and could continue to improve prices. Despite this positive outlook, it is imperative to realise that BC hardwoods can only substitute in a narrow range of traditional applications.

The lower grades of products, frame and pallet, are facing a mixed future. Upholstered furniture, particularly in the Western US states, is a key opportunity for frame grades of alder and potentially birch, this market can also use other materials. The demand for birch in high end pallets is growing in parts of Europe, but customers/ markets can also use other competitively priced products.

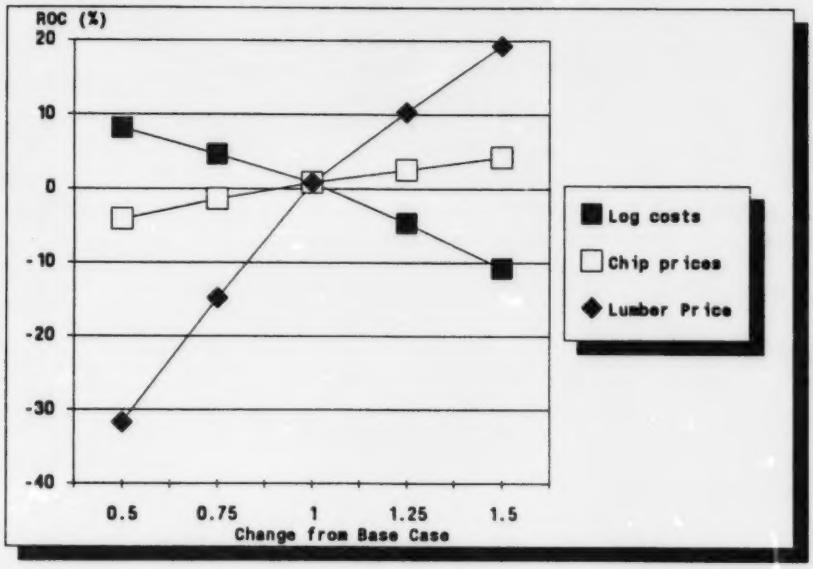
Figure 2
Cherry and Alder Prices
(US$)



Source: Hardwood Review

The sensitivity of ROC to changes in the product values and to changes in log costs and chip prices are shown in Figure 3. Log costs represent approximately 36% of total costs compared to over 80% in the chipping facility option, therefore ROC in the primary operation is not as sensitive to changes in log costs.

Figure 3
BC Hardwood Sawmill
Sensitivity of Return on Capital



Like the chipping facility ROC is very sensitive to end-product prices (i.e. lumber prices in this case), suggesting that if a higher grade of lumber can be produced attractive returns could be realized - assuming that other costs remain at base levels. On the downside, if costs of a particular operation are higher than those portrayed in this "base case" situation then the firm will be more vulnerable to declining lumber prices.

The capital cost for the base case has been estimated at $3.4 million. Land costs, which are included as part of the total capital, will depend on the site location, and could vary dramatically. The astute entrepreneur has an opportunity to reduce these costs and hence improve the ROC.

The example given as a base case is to some extent not an average situation. For many small and medium sized mills, it is extremely difficult to sell their chips and raise capital to construct planing and drying facilities. To demonstrate some of these 'realistic' situations, the economics for five different sawmilling situations are shown in Table 3. It is unequivocal that investment into any one of these alternatives is not attractive.

Table 3
Five Sawmill Options

	Small Mill	Medium Mill	Medium Mill #2	(Base Case) Medium Mill #3	Large Mill
Output (Mfbm/yr.)	2,400	5,300	5,300	5,300	8,000
Capital ($)	500	3,000	3,400	3,400	8,000
Labour/Day (persons)	12	22	28	28	40
Revenue ($/Mfbm)					
Lumber	280	330	430	430	430
Chips	-	-	-	74	74
Total	280	330	430	504	504
Cash Costs ($/Mfbm)					
Logs	166	166	166	166	166
Labour	185	155	198	198	187
Materials/Supplies	80	78	78	76	76
Admin., Sales & Fixed	25	57	57	57	45
Total	456	456	499	497	474
Cash Flow before Taxes ($/Mfbm)	(176)	(126)	(69)	7	30

Notes:
2 shift basis - 240 days
capital costs include land costs

100% Equity
Small Mill - sells green unedged boards; cannot sell chips
Medium Mill - sells green edged boards; cannot sell chips
Medium Mill #2 - sells planed, dried edge boards; cannot sell chips
Medium Mill #3 - sells planed, dried edge boards, sells chips
Large Mill - sells planed, dried edge boards; sells chips

Case 3: Integrated Chip/Primary Facility

Base Case

This case explores the option of vertical integration for the chipping plant (Case 1) or adding a chipping facility to the primary mill (Case 2). The base assumptions and economics of this case are shown in Table 4 below.

Table 4
BC Integrated Chipping/Primary Facility
Economic Attributes

Chip output	170,600 m^3/year
Lumber output	8,480 Mfbm/year
Input requirements	200,000 m^3/year
Capital costs	$4.8 million
Working capital	$1.1 million

	$ Million	$/Mfbm
Revenues		
Lumber	3.64	430.0
Chips	7.69	905.0
Total	11.33	1,335.0
Cash Costs		
Logs	7.00	825.0
Labour	1.10	130.0
Materials & Supplies	1.10	130.0
Admin, Sales & Fixed	0.51	60.0
Total	9.71	1,145.0
Cash Flow Before Taxes	1.62	190.0
Cash Flow After Taxes	1.00	118.0
Return on Capital (before tax)	27.5%	
Return on Capital (after tax)	17.0%	

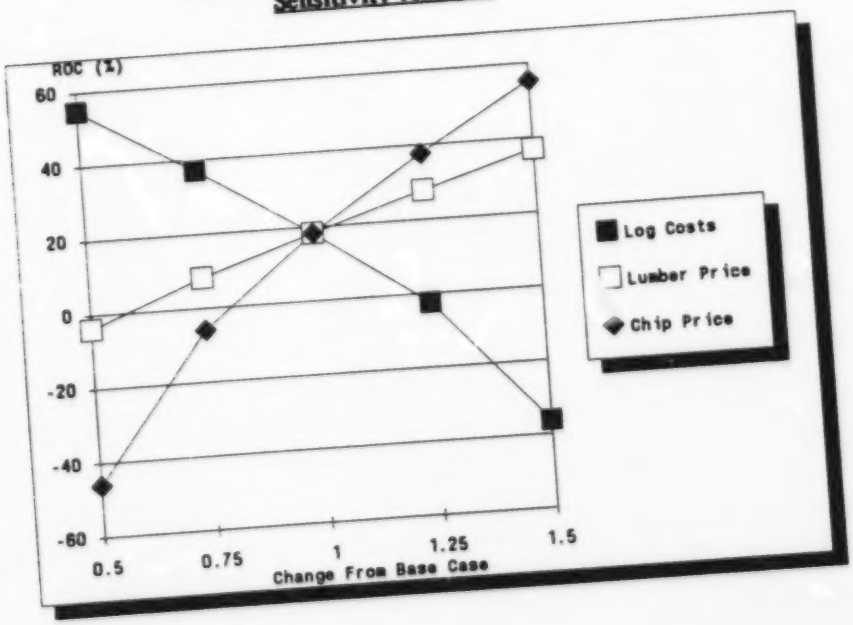
Assumptions:
- Fibre diet: 80% pulpwood; 20% sawlog
- Lumber recovery factor - 50% green
- Manpower 28 persons @ $15/hr plus 30% benefits
- 2 shifts, 240 day basis
- 100% equity
- 38% tax rate
- return on capital is calculated on capital costs plus working capital

This mill must be sufficiently flexible to satisfy both markets; that is, the chip and the various lumber markets. When the offshore markets are the only outlet for chips, which is the case for alder today, a certain volume of chips has to be produced to make shipping economical and to maintain a stable relationship with the customer. It is necessary to achieve a critical balance between output of all products in order to maximize profits.

Sensitivity Analysis

Product prices and log costs are varied through the same range as the chipping facility and the primary mill. These trends are shown in Figure 4 below. While it is interesting to note that this mill shows a base case value that is very similar to the chipping plant, the investment is considerably more attractive and stable in down markets, represented by a combination of both or either rising log costs or falling product prices.

Figure 4
Integrated Chipping/Primary Facility
Sensitivity Analysis



Case 4: Remanufacturing Facility

Base Case

The economics of a remanufacturing facility that produces pallets from its lower grade lumber and various value added components from the medium to higher grade stock is shown in Table 5 below.

Table 5
BC Remanufacturing Facility
Economic Attributes

Scale of output	4,240 Mmfbm/year	
Input requirements	5,300 Mmfbm/year	
Capital costs	$3.0 million	
Working capital	$0.3 million	
	$ Million	**$/Mfbm output**
Revenues	3.29	775.0
Cash Costs		
Lumber	1.96	462.0
Labour	0.36	85.0
Materials/Supplies	0.31	73.0
Admin, Sales & Fixed	0.10	24.0
Total	2.73	644.0
Cash Flow Before Taxes	0.56	131.0
Cash Flow After Taxes	0.35	81.2
Return on Capital (before tax)	17.0%	
Return on Capital (after tax)	10.6%	

Assumptions:
- Output distribution:
  - 20% pallets @ $570/Mfbm
  - 60% value added components @ $1,100/Mfbm
  - 20% falldown @ $0/Mfbm
- Input material - 25% pallet grades @ $180/Mfbm
  - 75% shop or better @ $430/Mfbm
- Manpower - 9.5 persons @ $15/hr. plus 30% benefits
- 1 shifts, 240 day basis
- return on capital is calculated on capital costs plus working capital

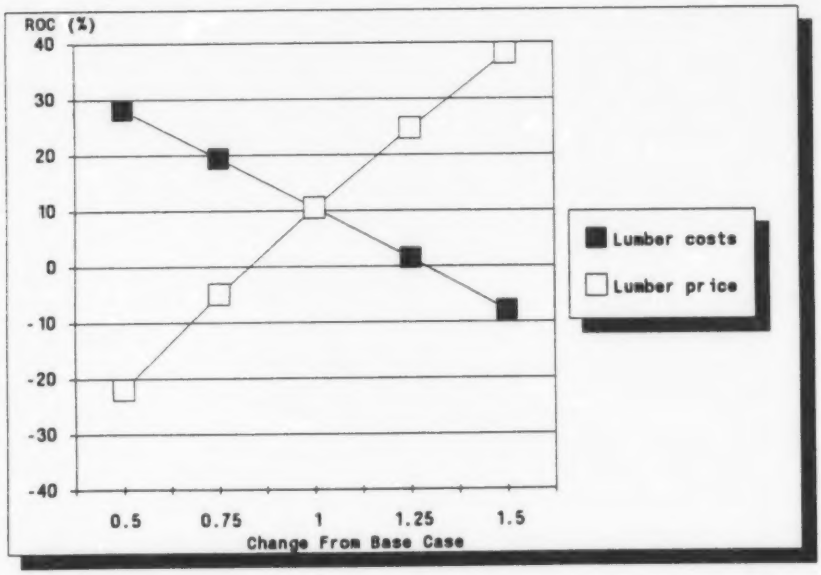
The value added products includes door and window components, furniture stock and components and mouldings. The high valued material is manufactured for both the domestic and international markets. The market for the pallet material, which includes pallets, containers, skids, boxes and crates, is North America. The facility can utilize both or either birch and/or alder.

Sensitivity Analysis

The sensitivity of this remanufacturing facility to changes in input costs and output prices and capital costs are shown in Figure 5. Return on capital (after tax) is less sensitive to wood input costs vis-a-vis the integrated/chipping facility but, since these costs are still a major component in this facility, the success of the operation is very sensitive to wood costs.

The venture would be more attractive if higher product grades can be produced but there is still a need to have a market for the lower grade and falldown material.

Figure 5
Remanufacturing Facility
Sensitivity Analysis



Case 5: Integrated Primary/Remanufacturing Facility

Base Case

The economics of an integrated facility are shown in Table 6, below. It is assumed that all lumber from the primary facility is fed through the remanufacturing arm. The products produced are similar to those described in Case 4.

Table 6
BC Integrated Primary/Remanufacturing Facility
Economic Attributes

Scale of output	4,240 Mfbm/year
Input requirements	25,000 m^3/year
Capital costs	$5.4 million
Working capital	$0.4 million

	$ Million	$/Mfbm output
Revenues		
Remanufactured products	3.29	775.0
Chips	0.39	92.0
Total	**3.68**	**868.0**
Cash Costs		
Logs	0.88	208.0
Labour	0.93	220.0
Materials/Supplies	0.38	90.0
Admin, Sales & Fixed	0.19	45.0
Total	**2.37**	**563.0**
Cash Flow Before Taxes	**1.31**	**305.0**
Cash Flow After Taxes	**0.81**	**190.0**
Return on Capital (before tax)	**22.6%**	
Return on Capital (after tax)	**14.0%**	

Assumptions:
- Lumber recovery factor - 50% green
- Chip recovery factor - 35%
- Primary product distribution:
  - 20% pallets @ $570/Mfbm
  - 60% value added components @ $1,100/Mfbm
  - 20% falldown @ $0/Mfbm
- Manpower - 25 persons @ $15/hr. plus 30% benefits.
- 2 shifts, 240 day basis
- return on capital is calculated on capital costs plus working capital

The advantages of this option are:

- The firm has more control over the consistency, security and quality of raw material supply. That is, the continuity of communication between processes is much clearer when the two are combined. This equates to economies of efficiencies.

- The firm has wider market flexibility which lowers the market risk. For example, the firm can produce pallet stock grade lumber from its lower quality material and then move its clear material through the remanufacturing facility. And, if markets or log input quality shifts, the firm can produce more of one product and less of the other.

- The firm enjoys some synergies, particularly in labour and capital.

Two BC firms are actively pursuing integration opportunities. One mill, which will be consuming interior birch, hopes to be fully operational by the beginning of 1991. The other, Pacific Green Gold at Prince George, awaits a decision on a pulpwood agreement, but if awarded the licence, would consume birch, aspen and cottonwood in its integrated hardwood facility.

It should be borne in mind that the above facility has a market for its chips and is kiln drying its lumber.

Sensitivity

The sensitivity of the integrated facility to changes in log costs and lumber prices are illustrated in Figure 6. As expected, the ROC in this venture is not as sensitive to these three variables when compared to the other three cases - i.e. the chipping, lumber and remanufacturing facilities because of diversification.

Figure 6
Integrated Primary/Remanufacturing Facility
Sensitivity Analysis